CUH-H03954-24-P23546

BULLETIN OF
THE HISTORY
OF MEDICINE

ORGAN OF
THE AMERICAN ASSOCIATION FOR THE HISTORY OF MEDICINE
AND OF
THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

VOLUME 50 WINTER, 1976 NUMBER 4

RENÉ DUBOS AND THE CAPSULAR POLYSACCHARIDE OF PNEUMOCOCCUS

AN ORAL HISTORY MEMOIR*

SAUL BENISON

In 1924 René Dubos, trained as an agronomist in France, came to the United States to work for an advanced degree in the New Jersey Agricultural Experiment Station at Rutgers University. Influenced by Dr. Selman Waksman, in whose laboratory he worked, Dubos devoted himself to the study of problems in soil bacteriology. In the spring of 1927, soon after completing his doctoral dissertation, "Microorganisms in the Soil that Decompose Cellulose," Dubos applied for a post at the Rockefeller Institute for Medical Research, and was accepted by Dr. Oswald T. Avery. Dr. Avery's laboratory, one of the departments in the hospital of the Institute, was then engaged in a series of studies on the chemistry and immunological properties of pneumococcus. As a new member of the department, Dubos initially engaged in an investigation of the problem of oxidation and reduction by pneumococcus. In 1929, but two years after coming to the Rockefeller Institute, Dubos made a stunning contribution to the immunology of pneumonia by discovering a bacterial enzyme that decomposed the capsular polysaccharide of type III pneumococcus. The account that follows is a portion of

---

* Dr. René Dubos' Oral History Memoir is on deposit with the Columbia University Oral History Research Office. Under terms of its original submission the memoir is to remain closed until five years after Dr. Dubos' death. The excerpt published here is with Dr. Dubos' special permission and in no way mitigates the terms of submission to Columbia University.

BULLETIN OF THE HISTORY OF MEDICINE 50 459-477 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

an oral history memoir that I developed with Dr. Dubos during 1955 and 1956. It traces in some detail the events leading to his coming to the Rockefeller Institute as well as an analysis of the process of research which ultimately led to his first major scientific discovery.

Perhaps a word should be said here about oral history as a technique,[1] *and more especially, something about the history of this particular memoir. Oral history is both an old and new form of history. It is old in the sense that autobiography, which is its major component, has long been valued as an historical source. It is also old, because the basic interview techniques and preparation that the oral historian uses today is little different from those used by historians from time immemorial to probe and understand the nature of human events.*

The newer aspects of oral history stem from a variety of features. The first and perhaps most significant feature lies in the fact that the oral history memoir is essentially a hybrid document, prepared by both the participant in bygone events and an historian analyzing the nature of these events. The memoir that emerges from the oral history process gathers its strength from the preparation of the oral historian in traditional primary and secondary written and printed sources, the quality of the historical problems raised by these sources, and the historian's skill in using this preparation to stir and probe the memory of the person being interviewed. The weakness of the memoir lies in the subtle interplay between the person being interviewed and the oral historian. The oral historian not only acts as interrogator, he also serves as an audience to the person being interviewed. In his double capacity he affects the substance of the interview being given. It is for this reason that the reader must not only know the questions asked by the oral historian, but also the sources he used in preparation for the interview.

The second feature that makes oral history new is the tape recorder. This essentially new instrument not only records the substance of interviews with greater fidelity than has hitherto been possible, it also preserves the sound of the interview. In so doing, it adds a new dimension to the historical record in the form of psychological insights into the character, education, and cultural background of both the person being interviewed and the oral historian. In sum, it provides a new parameter for judging the value of the oral history memoir as an historical document. It is because of this feature that transcription and editing of the oral history memoir must be done with great care. While it is true that the oral history memoir may supply new and even

---

[1] One of the latest informative accounts on oral history and oral history techniques is R. Grele (ed.). *Envelopes of Sound* (Chicago: Precedent Press, 1974).

P23546

unique information that is not to be found in the written record, its chief value lies in the fact that it is in actuality a first interpretation of a mass of primary and secondary data by a participant in past events.

The oral history interviews with Dr. Dubos had their origin in a project in the history of modern medicine that was originally planned by Dr. Abraham Flexner and Professor Allan Nevins of Columbia University. In the fall of 1955 Professor Nevins gave me the responsibility of carrying out the project, and at the suggestion of Dr. Alphonse Dochez, then professor emeritus of bacteriology at the Columbia College of Physicians and Surgeons, I asked Dr. Dubos if he would participate in the program. Although Dubos agreed to be interviewed, he did not make available to me any of his private correspondence. He did, however, furnish me with copies of his scientific papers as well as those of several of his contemporaries in Dr. Oswald Avery's laboratory. More important, he urged me to examine the yearly reports which the various laboratories of the Rockefeller Institute submitted to the Board of Scientific Directors and the Board of Trustees. These reports proved a treasure trove. Indeed, they are probably one of the best primary sources in the history of scientific medicine in the United States in the first half of the twentieth century. The reports from Dr. Avery's laboratory between 1921 and 1935 and Dr. Dubos' scientific papers from 1927 to 1935 served as the primary source of my questions to Dr. Dubos in the excerpt that follows.

Having mentioned questions, I must explain why none are present. Unlike current oral history practice which recognizes the virtue and necessity of preserving the oral historian's questions, the rule of the Columbia University Oral History Office during the nineteen fifties was to integrate questions with the response of the person being interviewed, in order to produce a flowing historical narrative. As a result, oral history interviews at that time were essentially edited twice—once by the transcriber who integrated questions and answers,[2] and later by the oral historian after listening to the tapes. Actually, since Dr. Dubos spoke in almost finished periods, I had little editing to do in the following narrative.

I

As a result of working on my doctor's thesis, I prepared two papers. However, before publishing these papers, I attended an International Congress of Soil Science which took place in Washington during the month of

---

[2] In the transcription of the tapes I was well served by Terry Beshi, then a graduate anthropology student, who had rare skills as a transcriber.

June 1927. At that Congress, I presented a paper dealing with the phenomena I have spoken of. The chairman of the session at which I presented my paper was the very famous Englishman, Sir John Russell, who had written a good many books on the subject of soil science, and was by very far the most influential Englishman in the field. He was a very gracious man, who discovered faults and looked for and found virtues in the papers which were given. After I gave my paper, he brought out in such a clear manner the ecological significance of my findings that I felt I obviously had hit a note to which other people responded. Although my papers were to be submitted to the *Journal of Bacteriology,* where they properly belonged, for some peculiar reason the editor of a journal called *Ecology,* the existence of which I did not even know, called and asked me to publish it there. I agreed and my very first paper was published in that journal.[3]

After I finished my thesis, I continued my reading in the *Biochemical Journal* and became interested in those problems dealing with the most fundamental biochemical phenomena of life, which I like to call now the biochemical unity of life. I did this to such an extent that I wished that I could go somewhere else to receive further scientific training that would permit me to cope with these problems. I therefore applied for a National Research Council fellowship. As I remember, I applied for it in the month of March, so I assume that even before the International Soil Congress I intended to leave the field of soil science to deal, if possible, with more fundamental biochemical problems.

Very shortly my application for a fellowship to the National Research Council was returned to me with the statement that they were available only to American and Canadian subjects, and since I was a French subject, I was not eligible. However, someone in the office of the National Research Council—I have never known who that person was—as I remember it was a woman—added a little note, totally uncalled for, saying, "Why don't you go and ask advice and help from your famous fellow countryman, Dr. Alexis Carrel, at the Rockefeller Institute?"[4]

Now it sounds incredible, but at that time I did not know Dr. Carrel's name, even though he was an important and famous man. Neither did I know anything of the Rockefeller Institute. I knew, of course, that the Rockefeller Institute was the Rockefeller Institute for Medical Research, but I had never had the slightest thought that I would ever be connected with medical research. I never had had any teaching in it, and my only contact with the field was through the poultry pathologist, Dr. Beaudette.[5] Nevertheless, in those days I was a rather bold person and I wrote to Dr. Carrel asking to come and visit him.

---

[3] R. J. Dubos, "Influence of environmental conditions on the activities of cellulose decomposing organisms in the soil," *Ecology,* 1928, 9(1): 12-27.

[4] Alexis Carrell (1873–1944), a French surgeon noted for his work on the surgery of blood vessels as well as for his experimental research with tissue cultures

It was an extraordinary thing, but Dr. Carrel, who was such a famous and busy man, took the time to see me. I went to his office at the Rockefeller Institute, where he spoke with me and tried to explain why he couldn't be of any help to me. He was not in the field of microbiology and I didn't know any of the things that he was interested in. There was nothing he could do for me. But with that he said, "Let me give you one piece of advice: Don't accept an appointment, a teaching appointment, in a small college or a small school, because if you begin that way, you'll never get out of it, because your time will be preempted by teaching, and that will be the end of you."

He was about to dismiss me with these kind words, when he said, "Well, why don't you come to lunch with me?" It was noon, and so we went down to the lunchroom of the Rockefeller Institute, and went to sit by a small gentleman who said, "How do you do?" That person was Dr. Oswald Avery, then one of the most famous bacteriologists at the Rockefeller Institute. Dr. Avery, with whom I was to work for twenty years and who has been the greatest person in my life except for my mother, was also the most gracious human being that I have ever encountered. He talked to me at the table, was very nice, and then asked me to come to his office.

I believe this meeting took place in April of 1927. I, fortunately, remember each and every detail of this event. I say "fortunately" because I have no doubt that it was *the* most important event in my life, and I remember everything separately. I sat at Dr. Avery's desk, in his small office, and he began pretending, as he always did, to be very much interested in what my problem was, asking me about the decomposition of cellulose, and soil microbiology, even though all that was very far removed from his experience, training or interest, since he was a medical bacteriologist and a physician. After I had told him my story, he said in a very—how should I say—timid and most shy manner, "Well here in this laboratory we also are interested in a substance which is something like cellulose. In truth it's not a cellulose, it's a sort of semi-cellulose, it's the complex polysaccharide that surrounds and envelops the pneumococcus."

He was working then on pneumococcal pneumonia, and had made a very great discovery a few years before, that virulent pneumococci are surrounded by a complex capsular polysaccharide that forms an envelope around them. And it is that capsule that protects them from the defense mechanisms of the body. It was the very problem that was to make me a well-known man a few years later.

---

[5] Dr. Dubos' reference here is to Dr. F R. Beaudette, the distinguished poultry pathologist of the New Jersey Agricultural Experiment Station.

Then Dr. Avery told me, "For many years now we have been trying to decompose that semi-cellulose polysaccharide envelope. It is resistant to every enzyme that we know, and yet if you would help us to decompose it, that would permit us to do some other experiments, interesting experiments. The only thing we know that could decompose it is through strong acid, hydrochloric acid. But of course that destroys everything, so we cannot use it."

Immediately at that, I remember very well, his opening his right hand drawer, taking a little tube (which fortunately I could take from him when he retired from the Rockefeller Institute) about two or three inches long, containing that capsular polysaccharide and shaking it in front of me and telling me, "If we ever could find an enzyme that would decompose that substance, we would be very far ahead. That would open all sorts of possibilities."

I immediately replied, something that I assume I would never do again, "Well, it seems to me that if there were no enzyme that could decompose that capsular polysaccharide, it would accumulate in nature, there would be mountains of it now. So there must be, somewhere in nature, some microbe that would decompose it." I remember saying, "And since I have nothing to do this summer," (which was true, I had no project, no plan), "I'd like to come and work on it."

Dr. Avery was very kind and smiled, and the conversation went on. He then took me to visit two persons whose names didn't mean anything to me. One of them was Dr. Rufus Cole, who was then Director of the Hospital of the Rockefeller Institute, where Dr. Avery was the head of the division of respiratory disease, and from Dr. Rufus Cole he took me to visit Dr. Simon Flexner, who was not only the Director but the founder of the Rockefeller Institute. They said nothing to me and I left them and never heard anything more from them.

In the meantime, of course, I occupied myself with the problem of making a living the following year. Dr. Waksman urged me to stay on another year, saying that he would manage to find me another fellowship, so that I could go on with the problem of the decomposition of cellulose. However, I was not too eager to do it because I knew that I had exhausted the possibilities at Rutgers. I wanted to move on. Moreover, I wanted to make more money and I began to apply everywhere for positions.

I really had no plan. Since I couldn't get the National Research Council fellowship, I dismissed thoughts of purely abstract scientific research from my mind, and I decided that I'd like to make some more money. I first applied for a job to some industrial research laboratories, but I didn't get anywhere. Then I applied for a teaching position to the Dean at the Agricultural Experiment Station with little more success, although that was where I had received my training. The only two places where I found vague openings were in Nevada and the Agricultural Experiment Research station at Fargo, North Dakota.

Since I was fairly familiar with foreign languages, I got, as a stopgap position, a small secretarial job with the International Congress of Soil Microbiology held in Washington during June 1927. Although it paid me little it did give me the opportunity of travelling with the delegates of that Congress all over the United States. Through an arrangement with special funds I travelled free of charge, all expenses paid, in a chartered train visiting various experiment stations, examining all sorts of soil formations and the like. It was a most interesting trip, and was the first time that I had travelled throughout the United States.

In Chicago, I met the Director of the Experiment Station in Fargo, North Dakota, who recognized my name and told me he was glad to meet me because it afforded him an occasion to look me over and discuss the job situation at the station. When we arrived in Fargo, North Dakota, I was offered a job at $3600 a year. For me at that time it was an enormous amount of money, and I had just about accepted the job when a telegram that had been chasing me caught up with me. It was from the Rockefeller Institute offering me a fellowship at $1800 a year to work in Dr. Avery's laboratory. I immediately wired back an acceptance and returned to New York. There, I collected my savings and went abroad to see my mother since I had not seen her for almost three years. I spent three or four weeks in Europe, returned to New York, and began my life at the Rockefeller Institute.

II

When I arrived at the Institute, my first impression was that the atmosphere of Dr. Avery's laboratory was so peaceful that I had even some doubt that there was much eagerness among the workers in the laboratory.[6] I believe it took me at least one or two months to realize that manner in which

---

[6] On Dubos' arrival at the Rockefeller Institute in 1927, among others working in Dr. Avery's laboratory were Drs. William Tillett, Ernest Stillman, Louis Julianelle, Walter Goebel, and Martin Dawson. In the years that immediately followed, Drs. Thomas Francis, Frank Babers, Kenneth Goedner, James Alloway, and Edward Terrell also joined the laboratory.

Dr. Avery conducted his department. What was peculiar to it—and this I will have to discuss at much greater length later—was the fact that Dr. Avery never asked anyone to do anything. In fact, he almost urged people not to do too much. Of all the persons I have known in science, he certainly was the man who most was concerned with thoughts, long thoughts and meditation, before doing experiments, instead of the usual manner of rushing in and doing as much laboratory work as possible.

So that in practice, when Dr. Avery returned from vacation, hours and hours were spent for weeks doing nothing but talk. And in fact, it was chiefly Dr. Avery himself who did the talking. He would have each and every one of us in his office, and review, in the form of conversation—not in the form of a systematic review, in the form of conversation—the problems that he had dealt with the year before and the problems he had thought about during his vacation, which he always spent on Deer Isle in Maine.

It is very difficult for me to remember what he talked about that year, because everything was so new to me. All the occupations, preoccupations of the laboratory at the Rockefeller Institute were so completely different from that with which I was familiar that everything seemed strange, and I can't remember now which thoughts stood out as the most interesting or the most influential. However, it's certain that my attention immediately was focused on some practical problems of cultivation of the pneumococcus in the laboratory. Suffice it to say, the pneumococcus, which was then the center of Dr. Avery's interest, or the interests of his department, was very difficult to cultivate in ordinary culture media. Many of our experimental difficulties were due to the fact that the culture media sent to us from the preparation room often failed to give the growth that we expected. Very soon, through conversation with other persons in the laboratory and with Dr. Avery himself, I became aware of that very simple technical difficulty—growing the microorganism with which we were supposed to work.

In addition, Dr. Avery talked to me at great length of the work that had been done the two or three years prior to my arrival by Dr. James Neill, who had spent much time dealing with oxidation and reduction processes in pneumococci.[7]

It is most important to remember that all the phases of Dr. Avery's department activity which had to do with the pure methodological aspects of bacteriology were so new to me that I could not very well adjust to them in operational terms. I had to learn the very words that were being used, because essentially they were meaningless to me. However, Dr. Avery's conversations on Dr. Neill's work on the oxidation and reduction processes dealt with an aspect of bacteriology with which I was familiar, not only from the training I had received at Rutgers, but more especially from my reading in the English *Biochemical Journal* where this area of biochemistry, namely oxidation, and reduction, was being widely discussed. It was one of the most active fields of biochemistry at that time.

---

[7] For an account of Dr James Neill's research see O. T. Avery, *Report to the Board of Scientific Directors of the Rockefeller Institute*, vol. 12 (1923–1924).

Because the question of improving culture media was a very practical one which I could appreciate, and because Dr. Avery had talked about oxidation and reduction processes, I decided to undertake the study of culture media as my first project. In fact, I probably never made a formal decision. I just started doing experiments in this field, because at that time those were the only experiments that I knew how to do. I could not experiment with immuno-chemical problems, because they were too far removed from my experience.

The starting point of my experiment was this: It had been shown by Drs. Avery and Neill, some years before, that in culture media pneumococci gave rise to the production of hydrogen peroxide. Their findings further suggested that hydrogen peroxide, in certain cases, was toxic to the very pneumococci that produced it. So, for no better reason than that, I decided to set up some experiments to test the effect of removal of oxygen from the medium on the growth and viability of pneumococci. During these years, there was at Johns Hopkins Medical School an investigator named William Mansfield Clark, who had gained great fame in the United States through a series of papers on oxidation and reduction processes, including the biochemical phenomena carried out by bacteria. Mansfield Clark had in particular introduced, as a technique, the measurement of oxidation and reduction potentials by observing the reduction of certain dyes which changed color from the oxidized to the reduced form.

Therefore, there was available at that time a large series of dyes whose oxidation and reduction characteristics were known. These dyes had been made available to laboratory workers through the LaMotte Chemical Company, a very small company, which apparently must have been working in close cooperation with Clark, because I believe it disappeared as soon as interest in that line of work began to subside.

In any case, after reading Mansfield Clark's papers, I obtained from the LaMotte Company all the dyes that Mansfield Clark had studied, and added them to the culture media that were then being used for the cultivation of pneumococci. I then observed what happened to these dyes when oxygen was removed from the culture medium. By the way, the advantage to all these techniques was that they were very simple once you had dyes made available to you by a commercial firm.

While carrying out these operations, I became aware of the fact that the ordinary culture media had the power to reduce the dyes when oxygen was removed from the environment. I carried out a number of experiments which in retrospect were extremely crude but yet provided me with a fundamental piece of information, namely, that all culture media that were capable of growing pneumococci were also media that had a strong affinity for oxygen, since by themselves, they were capable of reducing the dye when oxygen was eliminated from the medium. From this observation, through steps that I cannot remember now, I tested what the effect would be of the removal of oxygen on the growth of pneumococci, and to my great surprise found something which I believe I was the first one to find, namely, that pneumococci grew much more readily when oxygen was removed from the medium than they did when oxygen was bubbled through the medium.[8]

In practice, that led me to the recognition that the factors which determine the initiation of growth, the ability of the micro-organism to start multiplying in a culture medium, were different from those that determine the amount—the total amount—of growth that could be obtained in a certain medium. I came to realize that there was a dissociation between factors responsible for the initial multiplication of the organism (the ability of the organism to divide and therefore to multiply) and the factors that permitted the accumulation, within a given medium, of a very large amount of cells. This is a point of view which has some importance, because I applied it much later to the cultivation of tubercle bacilli.

My attempts at growing pneumococci, and in particular attempts at initiating growth of very small numbers of cells, led me to recognize that many of the ingredients used in the preparation of the culture media had in fact a toxic effect on pneumococci. Without having large practical or theoretical importance, this awareness led me to carry out purification of the peptones—commercial peptones—that were then being used, and to devise peptones of slightly better and different characteristics which are still today used in practice.

But more important than these practical results was the fact that I became quite convinced that the phenomena which controlled the multiplication of pneumococci were also applicable to all kinds of cells. I don't think that this point of view is yet quite generally appreciated, and I certainly have made little use of it myself. Most bacteriologists are likely to speak of a medium as a good medium, or a bad medium, or an indifferent medium, for the growth of a certain bacterial species. In reality, there are several independent characteristics of a medium that must be kept in mind. There are media that are very good for permitting a cell to start growing, but not satisfactory for obtaining large numbers of cells of the species under consideration. On the other hand, there are media that are not suited to the initial multiplication of a cell but which, if that cell can overcome the resistance offered by the medium, are quite satisfactory for obtaining very large yields of that particular cell. So that, if I were to use crude words to summarize a very complex situation, the circumstances, the environment favorable to allow the beginning of the activity of a cell, are not necessarily those that are best for permitting that cell to attain its maximum development.[9]

---

[8] The details of this research can be followed in R. J. Dubos, "Observations on the oxidation-reduction properties of sterile bacteriological media," *J Exper. Med.*, 1929, *49* (3): 507–523; "The relation of the bacteriostatic action of certain dyes to oxidation-reduction processes," *ibid.*, *49* (4): 575–592, "The initiation of growth of certain facultative anaerobes as related to oxidation-reduction processes in the medium," *ibid* , 1929, *49* (4): 559–573.

This early phase of my work at the Rockefeller Institute gave me a chance to do a great deal of reading in biochemistry and establishing contacts with other workers in the field of biochemical metabolic activities of living cells. I obviously did not have a good enough training in chemistry to carry these studies very far from the technical point of view, but I had read so extensively in it that I was capable of discussing biochemical problems with other people, of incorporating them in my thinking. Soon enough, I realized that this was not my field, and I more or less abandoned it, although, as I shall mention, I came back to it later under certain circumstances when it became useful for my bacteriological work.

All this, I suppose, took me some eight months. During that time I was naturally in contact with other workers in Dr. Avery's department. By and large, these people had more medical interests; they were concerned with the behavior of the bacteria *in vivo,* or the reaction of the animal body, or the human body, to the presence of the bacteria. In other words, the center of interest in Dr. Avery's department was certainly immunology, immunochemistry, mechanisms of infection, problems of pathogenesis. And through conversation with the workers in Dr. Avery's department, and especially through an immense amount of reading, I soon became a fairly sophisticated immunologist and overcame my initial fear of the subject, fear that was due to lack of knowledge.

---

[9] O. T. Avery, *Report to the Board of Scientific Directors of the Rockefeller Institute,* vol. 18 (1929–1930), especially the subsection prepared by Dr. Dubos, pp. 224–227.

It must not be forgotten that the reason Dr. Avery had brought me to the Institute was precisely to deal with one of these immuno-chemical problems. It is very likely that, in the course of his endless conversations with all of us, he repeatedly brought back the problem to my attention. So that some time after eight months, I began orienting my interests toward immuno-chemical studies, and this brought me to deal with the very problem for which Dr. Avery had brought me to the Institute.

Now the problem consisted in this: Dr. Avery and his associates had demonstrated that the virulence of pneumococci depended upon the existence around them of a capsule made up of a complex polysaccharide. Dr. Avery had shown that this polysaccharide prevented the tissue cells, the phagocytes, from engulfing the pneumococci and destroying them. It was known, as a matter of fact, that there existed some forms of pneumococci which had lost this capsule, and which then rapidly became prey to the phagocytes and were destroyed by them.

What Dr. Avery had in mind was the possibility of finding a reagent, and if possible a fairly specific reagent, like an enzyme, that would be capable of removing, destroying, the capsule surrounding the pneumococci. Fortunately, the work of his department had led, during the preceding years, to the separation from the pneumococci of that capsular substance so that polysaccharide was available in relatively large amounts and in a pure form in the laboratory. That amount consisted of several grams of purified polysaccharide of the various pneumococcus type strains.

This particular work had been begun in Dr. Avery's department, and carried almost to completion, by Dr. Michael Heidelberger, who had left the Rockefeller Institute and was then at the Presbyterian Hospital, where he eventually became Professor of Immunology. The work had also been continued by Walter Goebel, who was an immunochemist, and was still associated with Dr. Avery, and remained in the department as long as I did.

The important thing is that the capsular polysaccharide of pneumococcus was readily available in purified form. Moreover, equally important was the fact that there were exquisite, sensitive and specific immunological techniques that permitted us to detect the presence or the absence of that polysaccharide, the technique depending upon the fact that the polysaccharide reacted specifically in very high dilution with the serum of animals immunized against the pneumococcus. All these techniques had been worked out in previous years in Dr. Avery's department.

So, in reality, the most important part of my retraining, from that point of view, was to become aware of the existence of this serological reaction for the detection of the capsular polysaccharide and of making use of it for searching for micro-organisms that could be capable of decomposing the polysaccharide. In fact, what I did was to start with the assumption that the polysaccharide of pneumococcus did not accumulate in nature. It disappeared. If it did not decompose, there would actually be mountains of it left, whereas it exists only where the pneumococcus grows—that's in the tissues of man—and then is eliminated in the urine and eventually disappears.

There did not seem to exist, in the tissues of man or animal, any enzyme that would decompose the polysaccharide. I made the assumption, pretty obvious now, I believe, that there did exist in nature bacteria or fungi or other micro-organisms that attacked the polysaccharide. The problem was merely one of finding where in nature there were bacteria or fungi capable of attacking the polysaccharide. The thought came to me that polysaccharide produced by the pneumococcus probably was not unlike other polysaccharides existing in the soil under conditions where organic matter is deposited and has to be decomposed.

I began to select samples of soil and of sewage in the hope that one of these might contain some bacterium or some fungus capable of attacking the polysaccharide.

I then devised a culture medium, and that was really my personal contribution, in which the only source of carbon was the pneumococcus polysaccharide. Anything that could multiply in that culture medium had therefore to be something that attacked the polysaccharide, since that was the only source of carbon in the medium.

In practice what I did was to make a very dilute solution—one to hundred thousand—of the capsular polysaccharide of pneumococcus (type III), inoculate it with samples of soil or sewage, then place these mixtures under all sorts of conditions of oxygen, acidity or alkalinity, any environmental conditions that I could introduce as a variable—in other words, really, a kind of organized empiricism à la Edison. It was introducing all the possible variables that I could think of into a system where there was only one source of energy, one source of food, namely, the polysaccharide capsule of pneumococcus.

Now, you will remember that I had a very exquisite test to test for the disappearance of that polysaccharide, namely, the ability of the polysaccharide to react with the serum of animals—rabbits or horses—that had been vaccinated against that pneumococcus. This was a highly specific reaction and a very rapid one which permitted me to trace in a few minutes whether the polysaccharide was still present or had been decomposed. Through this kind of organized empiricism I soon observed that in certain of the tubes the polysaccharide disappeared, and therefore I could readily assume that the polysaccharide had been decomposed by some bacteria or some fungus.

The first positive series that I obtained was from a tube that had been inoculated with a sample of cranberry soil from New Jersey where a great deal of organic matter was undergoing decomposition. Now, having found a culture in which the polysaccharide was being decomposed, I devised other synthetic culture media still containing only the polysaccharide as a source of carbon; and made many transfers into this medium, eliminating thereby anything that was not living either on the polysaccharide itself or on the break-down products of that polysaccharide. I finally obtained a culture in which the polysaccharide was decomposed even though I had heated the culture at 80° centigrade. Now 80° centigrade is a temperature that will kill most of the bacteria or fungi—in fact allow the multiplication only of those bacteria which produce those heat-resistant forms called spores. I finally had a crude mixture in which all the living things were resistant to heat and capable of decomposing the capsular polysaccharide. This limited the range so much that in practice there were only very few bacterial species to select in the mixture so that selection of them was rather easy. Moreover, I even rendered selection more specific by having a specific plating medium—by refusing to use, at any time, any of the ordinary peptone-media that all bacteriologists use, always insisting that my medium be so selective that very few kinds of bacteria could grow on it.

By the way, may I say that this is where I believe a person like Dr. Avery, or any of my colleagues in the field of medical bacteriology, could not have achieved what I achieved. In fact, as I see it now, my earlier training—my earlier experience—with the development of media for pneumococcus came to be useful. Because at that time I realized a good medium for my purpose was not one that gave a heavy growth, but rather a selective medium. So that, even though Dr. Avery urged me to enrich my media with peptones and sugars and with all the things that bacteriologists use, I steadfastly refused and selected a medium in which could grow only bacteria capable of attacking the polysaccharide of pneumococcus or of living on the split products of that polysaccharide.

Within an incredibly short time—I believe the whole experiment didn't take me more than three or four months, as I remember—I obtained a pure culture which was capable of attacking the capsular polysaccharide of pneumococcus.

That was, I well remember, some time in the month of May 1929. I'm almost sure that I isolated the bacterium that decomposes the polysaccharide in the month of May. Now, Dr. Avery went on his vacation late June. This certainly meant that he had little expectancy that this work would proceed very far during the summer. Otherwise he would have stayed.

After I had learned to grow the bacteria that decomposed the polysaccharide, I immediately tried to separate a soluble enzyme. I don't know whether you understand what the word means—it means, so to speak, the digestive juice through which the bacterium carries out the decomposition of the substances that it attacks. Here again, I was served with good luck. I decided that even though I obtained a very poor growth of the bacillus, I would grow it only on the capsular polysaccharide. Since the amount of food was very small, the bacteria went into the spore state, the protoplasm itself breaking down. I found that when I filtered through a bacteriological filter, I could obtain a solution which now was capable of decomposing the polysaccharide, even though no bacteria multiplied in it. In other words, I had the enzyme.

Here again, I believe that my success was due to the fact that all the time I used a very weak solution of the polysaccharide which permitted detecting its decomposition with the serological tests. In any case, I did get an active solution that could decompose the polysaccharide.

At that time I did by myself animal protection tests; this was my first venture in the field of animal experiments. It consisted simply in infecting a mouse with the smallest possible dose of pneumococcus type III, which I knew would kill this mouse, and then immediately after injecting into the mouse that filtrate, or enzyme, that I had obtained which was capable of decomposing the capsular polysaccharide of pneumococcus. Within about three or four weeks, I convinced myself that that filtrate was capable of protecting a mouse against infection with type III pneumococcus. I repeated the experiment several times, on mice, to be convinced of the phenomenon. These experiments ran through July and August. By the month of August, I had obtained a filtrate which, if injected into a mouse, would protect that mouse against bacterial infection. That was a great achievement, since nobody had ever been able to protect a mouse against infection except with the classical technique of immunology by an anti-serum.

III

After I had convinced myself of the validity of these experiments, I wrote to Dr. Avery. He immediately returned from his vacation, and we performed animal protection experiments under all sorts of conditions. I must say these later experiments were far more carefully done. We used a larger number of animals, calibrating the activity of the filtrate, seeing against how many fatal doses of pneumococcus one could protect a mouse, how late one could administer the enzyme, and moreover, even studying the mechanism of the effect of the enzyme. By staining the blood of the mouse, or its peritoneal exudate, one could see that the pneumococci were attacked in such a manner that the capsule surrounding them was being decomposed and then, when the capsule had been decomposed, that the phagocytes would immediately engulf the pneumococci, whereas these same phagocytes could not attack the pneumococci when they were surrounded by their capsules. It provided at the same time the most beautiful demonstration of the assumption that the capsule protected pneumococci from destruction by phagocytes. It was the first demonstration that one could achieve a protective effect against infection by a substance, an enzyme, which attacked a well-defined component of a bacterium.

Dr. Avery and I completed these tests during the month of September. However, I must say that Dr. Avery's part and participation in the experiments were merely that of gilding the lily, because all the essential phenomena had been demonstrated by the time he came back from vacation. Nevertheless when all the new tests were completed, Dr. Avery sent a paper describing them to *Science,* which we signed together, Avery and Dubos. That paper produced a great sensation.[10]

I think it's absolutely clear that I have an immense and abiding admiration for Dr. Avery. Yet I was grieved that he came back from vacation and put his name first to the paper, whereas I had considered that all the work was mine. It disturbed me very much because everybody was convinced that I had just been a pair of hands in Dr. Avery's laboratory and that everything had been Dr. Avery's work. The Director of the Hospital, Dr. Cole, for example, was convinced that all the work was Dr. Avery's. I resented that very much and was very upset. The endless letters of admiration for the achievement which Dr. Avery received from all over the world and which he showed me, were to say the very least, somewhat painful to me. It took me approximately three years to obtain a clearer view of this situation.

---

[10] The first report of the decomposition of specific polysaccharide of type III pneumococcus by a bacterial enzyme is to be found in O. T Avery and R J. Dubos, "The specific action of a bacterial enzyme on pneumococcus of type III," *Science,* 1930, *72*: 151–152. The detailed account of this work was sent to the *Journal of Experimental Medicine,* March 26, 1931. Cf. R. J. Dubos and O. T. Avery, "Decomposition of the capsular polysaccharide of pneumococcus type III by a bacterial enzyme," *J. Exper. Med.,* 1931, *54* (1), 51–71; O. T. Avery and R. J. Dubos, "The protective action of a specific enzyme against type III pneumococcus infection in mice," *ibid.,* 1931, *54* (1): 73–89.

It's plainly obvious to me now that in reality the most difficult part of the experiment had not been in doing things but in imagining that one could affect the pathogenesis of pneumonococcus infection by attacking a specific component of the bacterium. That idea was obviously not mine but Dr. Avery's. While I did introduce a certain originality in doing the experiment (by refusing to adopt the techniques that everybody wanted me to use), it's perfectly clear that the most original part of the work, the more difficult task of conceptualizing the problem, had been done before I came to the Rockefeller Institute.

This brings me to the last phase of my work with the capsular polysaccharide enzyme. In subsequent years we tested the effect of this enzyme on pneumonococcus infection in rabbits, rats, and monkeys, and in every test our original findings were abundantly confirmed; however these experiments did not introduce any new concepts. It was just doing the obvious things in immunology or immuno-chemistry. Fortunately some other aspects of the work developed which were entirely my own, and which perhaps have a greater interest than the possibility of attacking an infection by a substance directed against a specific component of a bacillus. I discovered that the bacterium which decomposed the capsular polysaccharide of pneumococcus grew very poorly on that capsular polysaccharide, whereas it grew very, very abundantly in the enrichment media that bacteriologists usually use, such as sugar, peptones, or proteins. At first it appeared that to produce the enzyme the only thing to do was to grow the bacteria in one of those media in which it grew abundantly. However, I soon discovered that whereas the bacteria grew abundantly and rapidly in peptone solution, or in the presence of sugar, it did not under these conditions produce the specific enzyme. On the other hand, if the bacteria were grown in a struggling manner in the medium containing the capsular polysaccharide, it produced that enzyme. This phenomenon has since been duplicated many times by other workers. It brought me face to face with one of the most interesting biological set of facts I have ever seen—namely, that cells have multiple potentialities, and that these potentialities usually become manifest only when the cell is placed in an environment where it is compelled to use them. I am convinced that it is one of the most important biological laws that I have ever been in contact with, and I take a great deal of pride in the fact that I discovered it without anyone's help or advice.[11]

---

[11] Dr. Dubos' later work with the capsular polysaccharide enzyme can be followed in O. T Avery, *Report to the Board of Scientific Directors of the Rockefeller Institute*, vol. 20 (1930–1932); vol 21 (1932–1933), vol. 22 (1933–1934). See also R. J. Dubos, "Factors affecting the yield of specific enzyme in cultures of the bacillus decomposing the capsular polysaccharide of type III pneumococcus," *J. Exper. Med.*, 1932, *55* (3):

Interestingly enough, just as I made my discovery a Finnish scientific worker (whose name escapes me now) published a paper describing a similar phenomenon. Felicitously he introduced a very good word for those enzymes which were produced by the organism only under circumstances when the organism had to make use of them, or needed them for survival. He called these "adaptive enzymes" as against, and in contrast to, "constitutive enzymes," which were the enzymes always produced by the organism. Clearly the enzyme I had discovered was an "adaptive enzyme."[12]

I think it's not without interest for the history of science that the fact that this Finnish worker (who by the way, did a magnificent piece of work; it was his doctor's thesis) by introducing these two words, "adaptive enzyme" and "constitutive enzyme," gained most of the credit for that discovery. The words were so good, so meaningful, that everybody associated the phenomena with him. And in truth he discovered and well demonstrated it.

There were in addition other reasons why my discovery, although made and published a little earlier than that of the Finnish worker, was not recognized generally. I think that in part it was due to the fact that my papers were published in the *Journal of Experimental Medicine,* which is a journal that goes in the main to medical workers, so that that aspect of my work was known only through its application to medicine, not through its larger biological significance. His paper on the other hand was published in a biological journal concerned with general biological problems.

I do not want to imply, however, that I wasn't given any credit for my discovery, because soon after my work appeared, Marjorie Stephenson of England, who was certainly one of the most respected biological workers in the world, devoted a rather long chapter in her book "Bacterial Metabolism" to my discovery of the multiple potentialities of cells which under normal circumstances remain hidden and only become apparent when the necessity arises for their manifestation. The fact, however, remains that the notion of adaptive versus constitutive enzyme is usually associated with the Finnish worker, whose name I seem to have forgotten.

I was so delighted with my discovery that I immediately tried to develop it further and I published two or three papers bearing on the mechanism of this phenomenon, showing that the cell produces the adaptive enzyme only when it produces new protoplasm as a response to the presence of that substance

---

377–391; "Studies on the mechanism of production of a specific bacterial enzyme which decomposes the capsular polysaccharide of type III pneumococcus," *ibid.,* 1935. *62* (2): 259–269.

[12] Dr. Dubos' reference here is to H. Karström, *Ueber die Enzymbildung in Bacterien* usw., Thesis, Helsingfors, Buchdruckerei Akpiengesellschaft Sana, 1930

in the environment. However, even though I struggled with the problem for three or four years, I couldn't carry it very much further. Now I realize that I couldn't have carried it further, because today many much better equipped scientific workers than I have been blocked by the same difficulties that I stumbled on. These difficulties rest on the fact that the solution of the problem bearing on the mechanism of the adaptive enzyme production involves two fields of knowledge which to date are still in the most primitive state. These are an understanding of protein synthesis (since enzymes are proteins) and an understanding of genetics (since the manufacture of an enzyme is controlled by the genetic makeup of the cell).

While I regret my failure, I have no reason to be ashamed of it, because not much has been added to this field since my early efforts, and what has been done has confirmed my early observations. Today the problem has been taken up again by Dr. A. M. Pappenheimer and Dr. Jacques Monod,[13] both of whom are very well trained in chemistry and genetics. Perhaps a break-through in this problem will occur through their efforts.

Addendum

While this article was in press, the following biography of Oswald T. Avery appeared: René J. Dubos, *The Professor, the Institute, and DNA* (New York: Rockefeller University Press, 1976)—Ed.

---

[13] In the decade that followed Dr. Dubos' interview, Dr. Jacques Monod and his collaborators at the Pasteur Institute, François Jacob and Jean Pierre Changeux, explicated some of the mechanisms by which regulatory and structural genes controlled the rate of cellular production or repression of the synthesis of enzymes. See further, J. Monod and F. Jacob, "Genetic regulatory mechanisms in the synthesis of proteins," *J Molecular Biol.*, 1961, *3* (3): 318–356; J Monod, J. P. Changeux and F. Jacob, "Allosteric proteins and cellular control systems," *J. Molecular Biol.*, 1963, *6* (4): 306–329

ALEXANDER READ AND THE CIRCULATION OF THE BLOOD

R. K. FRENCH

Read's Library

Alexander Read, or Reid, was a contemporary and colleague of Harvey, who has been represented by historians as opposed to the latter's doctrines of the circulation of the blood. Read's medical library survives, although dispersed, in the University Library at King's College, Aberdeen, and an examination of his books gives a fairer historical picture of his attitudes to Harvey and provides another and interesting example of the contemporary reaction to Harvey's book.

Alexander Read was born about 1570 at Banchory Ternan, and educated at King's College, Aberdeen. He travelled for a while on the Continent, where it is possible, but unlikely, that he obtained medical qualifications. He began practice in England as a physician and surgeon, moving from place to place. Apparently as a result of Court influence he was made an M.A. of Oxford towards the end of May 1620, and on the following day was created "Doctor of Physic" by letters from James I, whose Latin Secretary was Thomas Read, Alexander's brother. He belonged to both the Barber-Surgeons Company and the College of Physicians, and received a further medical degree at Cambridge.

Whatever the education that lay behind these positions and awards, his prime interest seems to have been surgery, and his publications are largely concerned with anatomy that would be of interest to surgeons. For two years from 1632[1] he lectured on anatomy at the Barber-Surgeons' Hall, and in 1634 he published his lectures in book form. However, D'Arcy Power says that Read was appointed to this post in 1628, replacing Dr. Andrews, Harvey's assistant.[2]

From about 1630 Read began to act as his own executor during his life, and put into effect the bequest to "the College of Auld Aberdiene," that is, King's College, of "all my medicinall books." At this period, perhaps for the first time since its foundation in the last years of the fifteenth century, King's

---

[1] W. Menzies, "Alexander Read physician and surgeon, 1580-1641," *London Biographical Society*, 1931, pp. 46-74.

[2] D'Arcy Power, *William Harvey* (London, 1897).

BULLETIN OF THE HISTORY OF MEDICINE 50 478-500 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

College had a vigorous teacher of medicine, the "Mediciner" as he was traditionally known. This was William Gordon, who demonstrated anatomy to his pupils from the dissection of animals, and who successfully applied to the authorities for opportunity to teach the same from human bodies. He died before his plan for an anatomical education could bear fruit, but for ten years he was in charge of medical teaching while Read's books were available within the college.

Read's Deed of Foundation of Bursaries in King's College of 1635[3] speaks of Read's affection for his alma mater, and the "certaine number of choyse buikis and volumes of divinities, medicyne, and other faculties and sciences, for helping and supplieing the decayed librarie . . ." together with globes, quadrants, mathematical instruments and a hundred pounds sterling, which he had already given. The books were "marked with the saids Doctors name in the frontispeeces, and were layde wp in the said librarie, to be keept therein for the good and publict use of the professouris and students of the saides Universitie and Colledge." Here we have the origin of the Read collection of medical books. This document states that the books came into the Library in 1631. It has been possible, by examining all the medical works published before 1640 in the University Library in King's College, Aberdeen, to reconstruct Alexander Read's library. Most of the books contain the characteristic inscription mentioned in the Deed, which appears as "Ex dono Alex. Rhead," and all can be identified by Read's characteristic scoring in red ink above and below words he considered important, by his neat hand and by his habit of writing the title and author on the top edge of the closed leaves of the book. Some 113 books can be identified in this way,[4] and the interest of the collection is not only that it is an example of a library of a successful early seventeenth-century medical practitioner, but that by means of his inscriptions, we can follow Read's thought on medical topics of the day, chief amongst them that of circulation.

Read's early bequest was warmly welcomed by the small and impoverished College, a University in its own right. A contemporary eulogy upon the benefaction was couched in the form of a physiological metaphor, entirely suitable for the studies that were to benefit from the receipt of Read's medical books. It may be rendered into English as follows:

> What food is to the body, books are to the mind; upon them it browses; it converts them to blood and juices, and upon them it thrives and flourishes. Without them it

---

[3] *Deeds of Foundation of Bursaries at the University and King's College* (Aberdeen [Printed by order of the Senatus Academicus] 1857), p. 18.

[4] Read's Library is listed in Appendix 2 below

P 23546

> would be empty, languishing, contracting and dying. Without them, our thoughts would be savage and crude. Of this, Alexander was aware, fearing barrenness of minds and anxious lest by it erudition should falter and die. Selecting what was suitable, he sent us books as a foretaste, an aperitif, to whet the appetite of languishing stomachs. Other foods are consumed and vanish in their use; in use, these books remain undiminished: thus does Alexander support us at this immortal banquet. Here the gravity of Theology is mixed with the subtlety of Medicine and the majesty of the Law; here flow together the sharpness of philosophy and the elegance of letters.[5]

Harvey's book was no more than three years old when the panegyricist Strachan thus extolled in Galenic terms the virtues of the immortal banquet of letters, and the Galenic notion of blood, derived from food in the liver and passing centrifugally to be assimilated in the body in turn as food, long remained a popular one in medicine.

Read's Publications

How popular did it remain with Alexander Read? How far did he accept the notion of the circulation of the blood? His apparent response to Harvey's book has brought down upon his head the criticism of later historians. D'Arcy Power[6] stigmatises Read for not accepting Harvey's doctrine, and is followed by such recent historians as Pagel, who calls Read an adversary of Harvey,[7] and Weil.[8] Chauvois[9] also follows Power closely. Read's "Galenism" is criticised by Lake.[10] Both Harvey and Read were teaching between 1628 and 1634, Harvey at the College of Physicians on Tuesdays, Wednesdays, and Thursdays, and Read at the Barber-Surgeons' Hall on Tuesdays; the two were colleagues at the College of Physicians, and yet apparently taught opposing doctrines; Read must have known Harvey, and in his presence examined the Lancashire witches for signs of witchcraft.[11]

Read's own opinion on circulation must be sought in his own writings, and in the notes he made in his own copy of Harvey's book and in the books of others. His first work was *Σωματογϱαφία ἀνθϱωπίνη*, or *A Description of the Body of Man,* London, 1616. This is an abridgement, made at the printer's request, of Helkiah Crooke's *Microcosmographia* which had been published by the same printer (W. Jaggard) in 1615. Read explains this in the preface, to avoid the charge of plagiarism, "seeing we live in a misconstruing

---

[5] Strachan, *Panegyricus inauguralis* (1631), p. 36

[6] D'Arcy Power, *op. cit.* (n. 2 above).

[7] W. Pagel, *William Harvey's Biological Ideas* (Basel: S Karger, 1967), p. 350.

[8] E Weil, "The echo of Harvey's *De motu cordis* (1628) 1628 to 1657 " *J. Hist Med.*, 1957, *12* 167-174.

[9] L. Chauvois, *William Harvey* (London: Hutchinson Medical Publications, 1957).

[10] B. Lake, "A discourse of the heart by James de Back," *Medical History*, 1966, *10*: 60-69.

[11] This interesting story is given fully in K. Keele, *William Harvey* (London: Nelson, 1965), p. 71

Age." The book consists simply of anatomical plates from the larger work with explanatory notes: there is no descriptive text. It went into a second edition of 1634, which includes notes on the use of 53 surgical instruments, as did the 1631 edition of the *Microcosmographia*. From the date of the first edition and the nature of the work, we should not expect any note of the circulation of the blood, nor even in the second edition; it was, that is, intended simply to be a guide to the larger work.

There is in King's College Library an interleaved copy of the first edition of this book, with much of Read's manuscript on the blank leaves. Menzies says this was used in preparing the second edition, but Read's title reads *The secund part of the manuel of the anatomie of the body of Man,* which resembles more closely *The Manuall of the Anatomy or Dissection of the Body of Man,* which was first published in the same year as the second edition of the first work. The partly manuscript copy was sent to the Archbishop of Canterbury for Licence to print, and was returned with an inscription of Laud's Chaplain, which also uses the title beginning *A Manuell of the Anatomie* . . . . This cannot be a "secund part" of the *Σωματογραφία*, for it uses many of the same plates and repeats many of the descriptions; it is certainly more like a second edition of it, but it is not the same as the printed second edition. At all events *The Manuall of the Anatomy* . . . depends greatly on *Σωματογραφία*, some of the plates being reversed copies, indicating that the blocks were cut from printed illustrations. It seems safe to conclude that as far as content is concerned, the succeeding editions of the *Manuall* are expanded versions of the early one.

Read also published *The Chirurgicall Lectures of Tumors and Vlcers,* London, 1635, based on his Tuesday lectures for the three preceding years. Next was *A Treatise of all the Muscles of the whole Body,* London, 1637, and *A Treastise on the First Part of Chirurgerie,* London, 1638, both based on his lectures in the Barber-Surgeons' Hall. Read's works became popular and were reprinted several times after his death, and spurious works were attributed to him. Menzies gives a full treatment of these works, the surgical portions of which need not detain us here.

More important is the *Σωματογραφία* and the *Manualls* derived from it. As noted, the anatomical material of the former volume is taken from Helkiah Crooke, and this in turn borrows from Bauhin's *Theatrum anatomicum,* or more precisely, the *Vivae imagines partium corporis humani,* which seems always to have been published with it. Some of the plates seem to have been taken directly from Bauhin, while others are somewhat cruder re-cut figures. A second source for Crooke was André du Laurens; these two anatomists are among the most popular authors of the time, and neither

Crooke nor Read make any secret of the fact that their books are digests of them. The same is true of the first edition of the *A Manuall of the Anatomy of the Body of Man,* which is "collected out of the best Authors" and directed towards novices. It is, moreover, dedicated to the Company of Chirurgeons; in short it is not the sort of book to enter into the controversial question of circulation of the blood.

Read is usually censured for allowing further editions of this book to appear without any modification of the pre-Harveian physiology within them. This is not entirely true, but certainly Read was far from readily adopting Harvey. The second, 1638, edition of the *Manuall* is again described by Read in the dedicatory epistle as a *compendiolum* designed for the *tyrones* of medicine, but we should perhaps expect some reference to circulation, for Harvey's book was now ten years old. In fact, Read goes as far as accepting the pulmonary circulation, observing that the arterial vein (the pulmonary artery) has valves directed away from the heart, and the venous artery (pulmonary vein) has inwardly directed valves "to let in blood carried from the *vena arterialis,*"[12] that is, across the lungs. This is later elaborated: "How the blood is carried to the left ventricle of the heart" which is explained thus: "First the blood is carried into the lungs by *vena arterialis,* by sundry *anastomoses,* and from hence to the left ventricle of the heart."[13]

He denies that air is carried bodily from the lungs to the heart, which was part of the debased Galenism current before Harvey, but cannot rid himself of other aspects of Galen's scheme of physiology. Thus he allows that diastole is an active phase of the movement of the heart, drawing blood from the vena cava into the right ventricle and air (despite his disclaimer) from the lungs to the left ventricle via the venous artery. In systole, arterial blood is forced back into the lungs by way of the same venous artery, vital spirits into the aorta from the left ventricle, and venous blood from the right ventricle into the lungs through the arterial vein. Here Read is in the interesting position of having adopted the force-pump motion of the heart in systole (which is foreign to Galenism) for a single vessel only, but not accepting any more of Harvey's doctrine. Without taking sides, he observes that Riolan believed that there were pores in the septum between the ventricles, allowing passage of blood—a Galenic idea which Read did not need to make use of. He still held, nevertheless, that the vena cava originated in the liver.

The third edition of the *Manuall* was published in 1642, a year after Read died. He had prepared it for the press, however, aware that his life was nearing its end: "This shall be the last that shall be published in my life-time, which is not far from its period. The Hour-glass hasteneth and but few sands remain unrun. The book of the Brest, and the book of the Brain are altogether new." Again, he makes no claim that the book is in any way an advanced anatomical textbook: "I am not so in love with my own labours, as to think that they can profit such as have made a reasonable progress in it."[14] The re-written book concerning the thorax leaves Read in a similar position. He now states categorically: "The pits are not permeable, and so no blood can pass through the *septum*."[15] In contrast to the second edition, he here states that the heart becomes longer and narrower in systole, suggesting that it is the forceful movement apart of the apex and the base of the heart that is responsible for systole and the expulsion of the "vitall blood." So he is now saying that an active systole also expels arterial blood (in the second edition he had said only venous blood, into the lungs) although his description of the lengthening of the heart in systole would not have pleased Harvey. Nor in this edition does he explain away the difficulty inherent in the Galenic system of physiology—why the venous artery is an artery but looks like a vein, and the converse for the arterial vein—by recourse to the Galenic ideas he had used in the second edition. He again described the pulmonary circulation, but still seems to accept that some vapours must return from the heart to the lungs. The result is that Read has moved halfway to meet Harvey: he believes the active state of the heart is systole, pumping out both arterial and venous blood; he believes in the pulmonary circulation; he does not believe in the pores of the septum. Finally, he does not indeed say that he rejects systemic circulation, but his retention of Galenic fragments and studious avoidance of discussion of the problem of circulation are the marks of a man who does not wish to commit himself, at least in the kind of book he was attempting—and indeed successfully—to write.

---

[12] A. Read. *The Manuall of the Anatomy or Dissection of the Body of Man* (London, 1638), p. 317.
[13] *Ibid.*, p. 320

In the light of this, D'Arcy Power's strictures on Read are rather severe. Power says that the reprinting of the *Manuall* involved no alteration, which as we have seen, is not so. He also observes that Read really means the right auricle in describing the *vena arterialis* as a vein from its function and an artery from its structure, and that Read "had no idea of the pulmonary artery as a distinct structure."[16] Now, it is clear that Read knew very well of the pulmonary artery (the arterial vein), because he had Galenic reasons for explaining its anomalous structure, in the second edition; in company with Galen, he would have regarded the auricle as being simply an extension of the vein. As noted, he did not repeat these Galenic reasons in later editions. Again, when Read discusses the venous artery, called venous from its structure and an artery because it (in Galenic terms) carried arterial blood, Power concludes that Read really has in mind the left auricle. In this Power is wrong; Read was simply expressing the orthodox anatomical opinion as to the nomenclature and function of these vessels.

---

[14] This is taken from the "To the Reader" of the fourth edition, 1650, which seems to be unaltered from the third. The fifth edition is the same as the fourth.

[15] *Ibid.*, p. 188.

[16] D'Arcy Power, *op. cit.* (n. 2 above), p. 234.

Read's copies of Bauhin and Spiegel

In his anatomical opinions in this matter, Read stands somewhere between Bauhin on the one hand, and Spiegel and Hofmann on the other. We have already seen how Read's anatomical publications were based originally on Bauhin, and as we may see from Read's own copy of the latter's *Theatrum anatomicum,* Bauhin was essentially a cautious anatomist. His works were scholarly and popular, but not adventurous; the *Theatrum* does not subscribe to the theory of pulmonary circulation. In it, Bauhin gives the usual Galenic reason for the structure of the pulmonary "artery" and "vein," and asserts that in diastole, air is drawn into the heart from the lungs, and is prevented by valves from returning. During systole, vital blood for the nourishment of the lungs and fuliginous vapours for exhalation are returned to the lungs, notwithstanding the functional direction of the valves. In short, this is unaltered Galenic physiology.[17] Read's copy of it bears remarkably few inscriptions.

In contrast, it is clear that his copy of Spiegel's *De humani corporis fabrica* (1632) was a work of constant reference. Each of the ten books comprising the work is, unusually, marked by a slip of paper glued to the first page of the book, summarising its contents. There is a great deal of characteristic red scoring and manuscript in black. Read's habit was to put a red line above and below the words or sentences he considered important and the manuscript notes in margins or other convenient place serve to draw attention to the author's opinions and arguments. Very rarely does Read disagree in these notes with what the author has to say; the notes simply express the importance of the text to him. He often supplies an index to much-read books published without one. Thus Read has marked the passage in Spiegel that says "I am with the very learned Vesalius, who thought that the blood in no way penetrated the septum."[18] This may be an overstatement of Vesalius' position, but it shows clearly enough where Spiegel stands. A little later he says firmly (and Read scored it heavily) "*Falsum enim est* that the blood moves through the septum, since the pits are not pervious."[19] Spiegel does not hesitate to come to the conclusion that follows from the premise of an impenetrable septum: if the blood is to reach the left ventricle of the heart, it must pass through the lungs. Perhaps influencing Read on this matter, Spiegel accepted the pulmonary circulation. After discussing in the usual terms the nomenclature of the vessels of the lung, Spiegel observes:

---

[17] Read's copy is the 1621 edition.

[18] A. Spigelius, *De humani corporis fabrica* (Frankfurt, 1632) p. 353.

> Both vessels arise from the heart, the vein having a higher origin than the artery, and relating to the right ventricle, not the left. Everyone thinks that the vein takes food to the lungs and the artery draws air to the heart. THIS OPINION rests on an absurd basis, for if it were true, there would need to be no blood in the artery. I would have been more prolix in refuting the opinion had I not been so certain that inspection and observation can demonstrate the validity of my own opinion without doubt.[20]

In this and other passages quoted, the capitals serve to represent those words scored above and below by Read. In this case his note in the margin reads: "The opinion is overturned." Spiegel continues

> . . . they are in a better position who say that the blood is transmitted from the right ventricle to the lungs through the arterial vein, and thence into the venous artery through anastomoses, and from there to the heart, where this blood of the right ventricle is more highly elaborated and becomes spirituous, and is forced through the great artery to sustain the life of every part of the body [Read's MS: The truer opinion. By which pathway blood flows from the right ventricle of the heart to the left] NOR IS IT true that air is taken into the venous artery, since there are no foramina there.[21]

To this last statement, Read adds the note: "Air in substance does not enter the heart." We may remember that Read said the same in the *Manuall,* but then relapsed into current physiology, which said the opposite. Little need be added to the passages quoted above, and to Read's treatment and use of them, to show the similarity between Spiegel and Read.

Further markings by Read show that he considered more of Spiegel's ideas. Firstly there is an odd *lack* of inscription when Spiegel puts forward his own idea that there is no origin of the veins; Read, like Bauhin, and orthodox Galenists, believing that the liver was the origin of the veins. We may perhaps here take Read's silence for disagreement. It is interesting to see that Spiegel to some extent was able to free himself from Galenic physiology by adopting Aristotelian attitudes; a position historically similar to Harvey, Cesalpino and to a lesser extent Hofmann. In discussing the

---

[19] *Ibid*, p. 357.
[20] *Ibid.*, p. 237.
[21] *Ibid.*

"origin" of the veins, Spiegel asks himself whether we should follow Aristotle, in locating the *principium originis* in the heart, or Galen, choosing the liver. It cannot be both, but perhaps we can say the veins have a *radicatio* in one or the other, or if that will not do, perhaps there is a *principium* of distribution or dispensation. In rejecting all of these alternatives, Spiegel is showing the reader the absurdity of the scholastic terminology; however, he is not just playing on words, for the situation is parallel to the earlier question of the origin of the nerves. Aristotle (it was commonly accepted), believing the soul to be in the heart, made the heart also the origin of the nerves. Galen, a superior anatomist, saw quite clearly that the nerves originate in the brain, and his views became orthodox. He did not, however, satisfy the Aristotelians of the Renaissance, who insisted that the *true* origin of the nerves was in the heart and that it was merely their gross physical presence in the brain that misled the Galenists: the nerves were seated "formally" or *radicaliter* in the heart, and it was simply their physical, "material" distribution or dispensation that occurred from the brain.

A similar position prevailed in relation to the veins, although Aristotle was correct in deriving them from the heart, and Galen wrong in saying they sprang from the liver; but by giving due weight to Aristotle, Harvey could think in terms of a circular transit of blood, and Spiegel freed himself from Galenic physiology.

Spiegel also accepts Harvey's view that systole and not diastole is the active phase of the heart's motion in expelling blood, for he says "The SPIRITUOUS BLOOD is forced through the body by the CONSTRICTION of the heart, by the contraction of the transverse fibres, just as we may press the stuffing up and down a sausage by squeezing with the hand."[22] This is very close to Read's later opinion, and more so when Spiegel explains that blood nevertheless *enters* the heart by the force of a vacuum caused by an active diastole.

Read's copies of Hofmann

Read seems to have been particularly interested in the question of pulmonary transit, and among his books there is a copy of Hofmann's commentary on Galen's *De usu partium,* published in 1625.[23] Hofmann was one of the pre-Harveian defenders of the idea of the pulmonary transit, and again it is interesting to see what impact the notion had among the medical practitioners of the time.

---

[22] *Ibid.*, p. 355.

[23] C. Hofmann, *Commentarii in Galeni de usu partium corporis humani* (Frankfurt-am-Main, 1625).

Little else than book six, in which Hofmann deals with the motion of the heart and blood, has received Read's attention in the form of inscriptions and scoring. Hofmann begins his attack on Galen on the vexed question of why the venous artery looks like a vein if it functions like an artery, and vice versa for the arterial vein. Certainly, Galen had said that arteries have thick walls to stop the finer, spirituous part of the blood escaping. Yet the vein that takes thick, venous blood to the lungs is also thick walled, and the artery that brings both spirit back from the lungs to the heart, *and* spirituous blood from the heart to lungs is *thin* walled. Why? Here we can see, says Hofmann, Galen's equivocal position, arising from no other cause than his deserting Aristotle. Galen had said that the vein in question had to be thick walled to avoid collapse in strenuous motions of the lungs, and to retain the finer-than-usual blood which alone was fit nourishment for the lungs, and that the artery was thin walled to accept and deliver air easily.

This explanation of Galen's is open to many criticisms even from his own premisses, and Hofmann uses most of them. Had not Galen already shown against Erasistratus that the arteries contain blood and not air? Is "spirituous blood" spirit or blood? Would it not be better to stick to the principle that the structure of a vessel is determined by the nature of the blood it carries? That is, that the fine arterial blood demands a thick coat in its vessel to prevent escape, and also because the coat transmits a motion, the pulse, while the coarser venous blood has no need of a thick coat or a pulse. "This would be thoroughly acceptable both to Aristotle and to Nature"—again we see the importance of Aristotle in those who would depart, however, slightly, from Galen—"and you might well ask why this arrangement is changed in the vessels of the lungs." The answer is, continues Hofmann in a lengthy argument (synoptically reported here, with words scored by Read in capitals and his marginal notes in brackets),

> that it has not been changed, if you consider it closely. THERE IS ONE DEVICE OF NATURE in the AFFERENT vessels and another in the EFFERENT: in the AFFERENT we can agree with Galen that the fine blood for the nourishment of the lungs has to be protected, but since this blood in fact passes across the lungs into the efferent vessel, WHY DOES THAT NOT ALSO NEED a thick walled vessel? With peculiar valves, IS IT ANY WONDER that this vessel, the venous artery, has a peculiar structure? No doubt the valves allow fuliginous vapours to pass, and no doubt the thin wall of the vessel aids the escape of them. But we are still left with the spiritous blood moving in a thin-walled vessel, contrary to the device of nature. THE SOLUTION to the problem is that the blood is cooled in its passage through the lungs, and is no longer liable to lose its spiritous content through a thin wall. The pulmonary transit is clear even from Galen's own words ON THE USE OF THE VALVES IN THE ARTERIAL VEIN, for he says their purpose is to hold the blood

there while part of it moves through the lungs to be imbued with spirit, and so doubly nourish the lungs. If the ARTERIAL VEIN has these pores into the lung and the venous artery pores out of the lung, then why should the pathway of blood directly through the lung, as suggested by Colombo, be absurd? So the BLOOD arrives from the vena cava into the right ventricle, is forced thence into the arterial vein, which deposits it back to the left ventricle by way of anastomoses in the lungs and the venous artery. The answer to the whole problem is not WITH OUR OPPONENTS to be pedantic and say "The vessels on the right side of the heart are veins and those on the left arteries," but simply to exchange the names of the vessels leading to and from the lungs, and say that all vessels leading *out* of the heart are arteries, and all coming *in* are veins. [Note the reasons for the change of names of the vessels of the lung.] THE FUNCTION OF THE VALVES in this respect cannot be over emphasised. AS ANATOMICAL TEXTBOOKS SHOW, the trachea is finely divided in the substance of the lungs and brings air into close proximity with the passing blood and cools it; JUST AS in a wine cooler I once saw, in the possession of Ferdinand Medici, Duke of Etruria, in which the ice melted and cooled the wine without coming into contact with it, and thus diluting it. [Note how the blood passing through the lungs is cooled.] This function of the lungs is NOT CONSISTENT with certain views of Aristotle and Galen that air enters bodily into the heart. [If air may be said to enter the heart.] Moreover the volume of blood involved is too great to imagine that it passes through the so called pores of the septum, DESPITE what Riolan has to say. [Note that the blood does not cross the septum.] SUCH A MASS OF BLOOD CAN ONLY FLOW, IN THE SHORT SPACE OF TIME between one diastole and the next through the obvious passages to and from the lungs; NATURE ALWAYS uses vessels and not flesh to transmit substances, in this case to the lungs: HOW ELSE can the blood be cooled? Nutrition of the lungs by this blood is ONLY A SECONDARY PURPOSE, the PRIMARY being the transfer of the blood to the left ventricle.

Hofmann is an important figure in assessing, first, views on the movement of blood before Harvey, and second, how widespread were deviations from Galenic orthodoxy. Hofmann clearly convinced Read, for the latter's annotations show that he followed every detail of the argument, and his own books show that the argument was accepted. It would be interesting to know when Read read the book, for while it was published in 1625 (three years before Harvey), Read's copy is found with another book of 1630 (see below). A third work bound with these two is Hofmann's *De thorace* of 1627, the title page of which says, "In which are discussed principally those objects of controversy between Aristotle and Galen," which again reminds us of Aristotle's influence on Hofmann. In it Hofmann again deals at length with the arguments for a pulmonary transit of blood, emphasising again that the *quantity* of blood involved is too great to pass through the "pores" of the septum. He mentions the answers provided to this problem by Arantius and Varolius, and Read's marginal note shows that the force of the quantitative argument was not lost on him. This book was published in the year before Harvey's

(Read's copy was of the 1628 edition) and it is interesting to see an independent use of one of the latter's strongest arguments, and one characteristic of the scientific revolution: the quantitative.

Read's copies of Harvey and Primerose

Hofmann's work was published in the year before Harvey's *De motu cordis:* it would be interesting to know which Read read first, whether for him Harvey's case was strengthened by Hofmann or vice versa. As he had a particular interest in the subject, we need not be surprised to find that Read had a copy of Harvey's book, which is bound with the first full scale attack on it, Primerose's *Exercitationes* . . . of 1630. Read has annotated both books fully, and provided at the end of each an index to these marginal notes. Again, the important stages of argument in the text are scored in red. The occasional correction of a printing error and more frequently, of Harvey's Latin, shows the care Read devoted to both books.

An examination of Read's copy of *De motu cordis* is a useful addition to the history of the reaction of contemporaries to the work—what was there in it that commended it to the reader? Again it may be noted that Read did not add critical notes to his books, and his opinions may be judged by the placing of his annotations. Thus in *De motu cordis,* we find that he has marked extensively those arguments relating to the pulmonary transit, which are also reflected in Hofmann's and Spiegel's books and his own work, and he is silent on Harvey's other novelties. He begins by marking Harvey's introduction (in which Harvey deals with the unsatisfactory state of current Galenism) at the point where it is argued that respiration and pulse do not fulfil the same function, and that arteries do not take in air and expel sooty wastes at the periphery: arteries contain blood alone. Read's notes stand against those passages in which Harvey argues that the blood is *not* moved in the heart and arteries by their forcible expansion, but as a result of the muscular contraction of the heart. Current thinking on the function of the right ventricle is strongly attacked by Harvey. Why is the right venrticle so like the left, if its function is so different? Why are their valves so similar, if one impedes the flow of blood, and the other of spirits? Why is the arterial vein so large if it carries only that blood needed to nourish the lungs? Lastly, cries Harvey in exasperation, "Good God! How do the mitral valves hinder the return of air and not of blood?" What keeps the spirits, sooty wastes and blood apart, when they are flowing through a single vessel in both directions?

These are the major faults of the Galenic scheme of physiology, and Read marked them and added notes. It will be noticed that they are concerned with aspects of the pulmonary circulation: this is where Galen was the most vulnerable and where he was first rejected; it is also Harvey's first stage in demonstrating the systemic circulation, for from it, given the route of the blood, its quantity and the pumping action of the heart, the fact of the greater circulation becomes a necessary conclusion. It is interesting to see that Read held that the premisses were true, but could not come to the conclusion: it has already been noted that in the later editions of his own work he held that the heart was a pump, and that it pumped blood through the lungs from right to left ventricle. Hofmann's observation on the quantity of blood involved also impressed him, but he does not seem to have considered what happened to this quantity of blood once it had passed through the lungs.

Harvey's second chapter is concerned with the systole of the heart, which is an active contraction in *all* inward directions. Read notes this, although it does not agree with his own odd analysis of the systole. The consequence of an active systole is that the arteries are filled up with blood like leather bottles, and do not actively draw blood from the heart like bellows (chapter three), Read notes. He is careful, too, to note Harvey's observation that the function of the auricle is to pump blood into the ventricles, which again shows that D'Arcy Power's criticisms are unjust. Read seems particularly interested in Harvey's observation that the heart becomes paler in colour on contraction. In chapter six Read only notes the arrangement and flow of the blood vessels and blood in the foetus, which he discusses in the later editions of the *Manuall.*

Up to this point Harvey has been establishing the pumping action of the heart and the fact of the pulmonary transit, with which Read largely agreed. In chapter eight, Harvey carries the argument forward to the systemic circulation. It is a momentous statement; that would be clear alone from Harvey's manner of making it. Read ignores it. This can only mean disagreement, for in the *Manuall* he states that the vena cava originates, in true Galenic fashion, in the liver (and could not therefore collect blood from a myriad of anastomoses with the finest divisions of the arteries). Read's Galenism is, moreover, debased, for he talks of a natural spirit in the "lower belly": the liver in man is large "lest spiritis should faile in performing the functions of the soule."[34] Galen's scheme did not involve a natural spirit, despite the belief of many physicians contemporary with Read (and despite the views of some modern historians).

This is our problem in trying to understand Read's reaction to Harvey: he is aware of the pulmonary transit, the pumping action of the heart, and with

---

[34] *Manuall,* 1638 ed., pp. 26, 61, 102.

Harvey at the beginning of chapter nine, he notes the amount of blood pumped out of the heart at every beat, and he notes how many times the heart beats in a given time. He even notes that the total is very large, but he does not conclude that this makes nonsense of the Galenic scheme, and that such a quantity can only mean circulation. In the greater part of this chapter, where Harvey forcefully comes to this conclusion, Read is silent. His markings appear again in chapter ten, not surprisingly, as this deals with objections to the theory of circulation, and in chapters eleven and twelve which are concerned with the evidence for circulation drawn from ligaturing the arm. The nature of Read's inscription gives the impression that he is interested from a surgeon's point of view—the ligatures employed in amputation and blood-letting correspond to Harvey's "tight" and "medium tight" ligatures. Likewise, his practical interest is awakened by Harvey's discussion of how various infections are distributed over the body from a small area. The remainder of Read's inscriptions are concerned with the valves in the veins—he goes so far as to note *sanguinem moveri ex circumferentia in centrum* (note that he carefully confines himself to reporting what Harvey had said)—and with many details of the structure and function of the heart.

Read's failure to be convinced by Harvey—and it must have been shared by many of his contempories—was a failure to rid himself of the great idea of classical antiquity, for which some justification can be found in Hippocrates, Plato, Aristotle and Galen, that the soul is divided into three, and that the lowest of these is concerned with nutrition and is located in the liver. Ingested food is converted to blood in the liver and this blood is itself the food of the body, reaching it by means of the veins, which originate from the liver as the vena cava. Circulation, however, made this sequence of events impossible, and *did not* replace them with anything else. To the older physician at least, Harvey's book must have seemed destructively critical, however well argued.

Reacting against this apparent destruction were physicians such as Primerose whose attack on Harvey was read and annotated with equal care by Read. Again, Read's notes occur most often where he is in agreement with the author, and he is silent, for example, when Primerose upholds Galen's doctrine of the pulse as an active dilatation of the arterial coats. The book is an explicit attempt to restore medicine to its "pristine splendour" and is really an exercise in shouting down Harvey's argument by reasserting the Galenic position. For this reason he has not been thought worthy of lengthy treatment by modern historians (Harvey's other opponents, like Hofmann and Riolan clearly being men of greater stature and originality), but it must be remembered that a reaction like that of Primerose must have been a very general one, and must have played a large part in determining how quickly Harvey's views were accepted.

Nevertheless, Primerose's orthodoxy makes his attack on Harvey predictable and, as Read's notes are merely points of emphasis, there is little point in discussing the book at length; it is worthwhile however to inspect Primerose's position on Harvey's most important arguments. Of these, the quantitative method is perhaps the most convincing to modern readers. Primerose argues that just as a vessel one-sixth, or even one-eighth full of milk will overflow when the milk boils, so very little blood in the heart will be sufficient for a great number of arterial pulsations, and therefore that calculations based on the volume of the heart and the number of beats in a certain space of time are invalid.[25] A similar explanation of the heart's motion was to be used by Descartes. Blood has to remain in the heart to be fully concocted, continues Primerose, and indeed none at all has to be expelled, for it may simply boil up into froth and then cool down again with diastole and systole; the result is that not as much as one ounce of blood passes into the arteries from the heart in the space of two hours.[26]

As for the permeability of the septum, have not the pores been seen by Galen, Vesalius, Bauhin and Riolan? Is it not as reasonable to suppose that the blood passes through the septum as through the lungs, as in neither case are channels visible? Primerose asserts that it is. As Harvey showed, if there is any point at which Galen is more vulnerable than his assumption of pores in the septum, it is his assumption that the valves of the venous artery do not function like other valves. Primerose is aware of the difficulty, but full of answers:

> At the moment of dilation of the heart, the sigmoid valves of the aorta are closed, and the tricuspid valves of the venous artery open to receive air. In constriction of the heart the fuliginous vapours are expelled, but not the air, which Nature retains to make vital spirit . . . To tell the truth, however, I am not entirely satisfied about the use of the tricuspid valves, which are only double, and do not perfectly close the orifice. There are two considerable doubts here (Read's notes and scoring), firstly whether these arteries pulsate . . . for if they do, they must be full of arterial blood, which would be an impediment to the incoming air, and if they move only with the motions of the thorax, then their valves open rarely and to a small extent, and they receive little blood. The second doubt is whether these arteries, since they contain spiritous blood, do not carry it back together with the air to the heart. The only answer, and it is a very probable answer, is that the heart is satisfied merely with the quality of air, and does not need its substance. We could alternatively say that air is

---

[25] J. Primerose, *Exercitationes in librum de motu cordis* (London, 1630), p. 71.

[26] *Ibid.*, p. 77

> attracted by the heart, and blood by the lungs. This would not interfere with the pulse of spiritous blood and fuliginous vapours, because the heart attracts the air and the lungs attract the blood through the drawing of different potencies (*per diversarum potentiarum tractum*). Again, we could say that air is drawn in in this way during dilatation, and blood expelled in constriction, for blood found in the venous artery (Read's scoring) is believed to have come from the heart.[27]

This passage shows clearly that a Galenic refutation could always be found for Harvey's arguments, and *for this reason,* accepting Harvey meant rejecting Galenic physiology as a whole, with its Natural Faculties rather than natural properties as explanatory principles. Read did not abandon Galenism entirely, but perhaps came near to doing so, for we can see from his marks in the above passage that he shared Primerose's doubts about the use of the valve of the venous artery, but that these helped to lead him to accept the pulmonary transit.

Summary and conclusion

This paper presents further evidence of the contemporary reaction to Harvey's book of 1628. This evidence has been drawn from Read's notes and marks in the books of his library and from his own publications, and is presented here in relation to its bibliographical sources. Read's own publications showed that his ideas changed with time from a position that was at first pre-Harveian to one that was later uncommitted. He does not expressly deny the systemic circulation, but evidence of persistent Galenic beliefs makes it unlikely that he entirely agreed with Harvey.

The means whereby he came to these conclusions are suggested by his annotations in the books of his library, the survival of which provides a fortunate and unusual opportunity to investigate the contemporary reaction to Harvey, and the thinking of an early seventeenth-century physician.

The changes in Read's ideas are indicated in this paper in connection with the dates of publication of his own books, and, with less certainty, with the dates of his reading those of other authors. We have noted above the change in Read's ideas in connection with those of other authors on the question of the movement of the heart and blood, and we can date to within a fairly narrow compass when Read gave his attention to these other authors. The library records say that Read's books were in King's College by 1631, and we know from Read himself that his gifts began in 1630. It seems then, that books bearing his manuscript must have been read by him before the former year, although, for example, the important work of Spiegel was not published until 1632. Read's manuscript notes in his copy of *De motu cordis* suggest that he did not read it until 1630 or later (see Appendix 2). His copies of Hofmann's books are bound with a third volume of 1630, and his marginal notes are unaffected by clipping during the binding, suggesting that they are made after binding, i.e. after 1630. We may suggest with some confidence then, that the combined weight of the books of Hofmann, Spiegel and Harvey, all read by Read within the space of perhaps two years, induced him to accept the pulmonary transit and approach the systemic circulation; or in other words, that Read's treatment of Harvey's idea was modified by his reception of the works of Hofmann and Spiegel.

---

[27] *Ibid.*, p. 36.

Lastly, there is a hint from another of Read's books, not so far mentioned, that his belief in the pulmonary transit antedated the years 1630-1632 during which he read the important books that were to affect his ideas expressed in his later publications, beginning in 1634. This book is his much-read copy of Knobloch's *Disputationes anatomicae et physiologicae* of 1612. The tenth dispute of this collection is concerned with the heart and in it are aired the views of Colombo, Plater, Varolius and Vesalius on the porosity of the cardiac septum and the passage of blood from the right to left ventricle. Botal's duct and Ulmus' notion that arterial blood is generated in the spleen and passed *up* the aorta to the left ventricle are both quoted as answers to the question of the motion of blood from right to left. All these views received Read's detailed attention, and all of course are more or less directly related to the pulmonary transit.

Appendix 1

Read's Notes in his Copy of *De motu cordis*

Read made numerous manuscript additions to his copy of the first edition of Harvey's book, and a study of these is useful in understanding his reaction to the work. Read almost invariably made his characteristic red over- and underscoring at the *opening words* of sentences that marked an important step in the laying out of Harvey's argument as interpreted by Read, or at important conjunctions during these arguments. All such manuscript additions are listed here, identified by a page and line reference. Not included are his corrections of misprints, improvements in Harvey's Latin style for greater clarity or elegance (with two exceptions), and his addition of missing brackets and ablative and adverb signs. Words below in italics are those from Harvey's text which bear Read's scoring, and those not in italics are Read's marginal notes. Any other manuscript additions are described within square brackets. All contractions have been expanded.

An asterisk denotes that the words preceding it are included in Read's own index of his annotations at the back of the volume. Bracketed and asterisked words are represented in the index but do not appear as such on the page quoted. We can probably assume that Read indexed the most important of his annotations.

[Title page. Read's copy has been severely clipped in binding, losing part of the text. Read has replaced a missing E, indicating that the book probably came to him in that condition, no doubt as a result of being bound with the *Animadversiones* . . . of Primerose. The latter work was published in 1630, so it is likely that Read's attention to Harvey was given after that date.]

4.4, *Exemplarium* .15, Caroli regis encomium.*

[10.2, Read deletes *quod* in an improvement of Harvey's Latin style]. (*Contra Empyricos 10 to 19)

11.1, *Si enim iisdem usibus* .2, Pulsum et respirationem iisdem usibus non inservire.* .10, ii .14, iii .14 *Similiter* .17, iv .18 *quomodo* .23, *Dicere vero* objectionis refutatio .25, *Et si in systole* .25, v .27, vi

12.4, vii .14, viii .14, *Praeterea quomodo Diastole* .16, ix .19, x .22, *Sanguinem in arteriis contineri* .32, Solum sanguinem in arteriis contineri*

13.5, *Aliqui dum dissolvere difficultatem tentant,* .6, Rationes contrariae sententiae examinantur .10, i 16.ii .16, *Si vero hunc* .20, iii .22, *Sin autem in Diastole,* .24, iv .24, *Amplius* .28, Insuper .38, v .32, *Sed arterias distendi*

14.21, *& saltus* .25, *Nec crassities tunicarum* .27, *Nam quibusdam animalibus arteriae* .31, An pulsatio derivetur a corde per tunicas arteriarum*

15.2, *Neque eundem usum pulsus, ac respirationis quis existimet,* .5, *Nam non solum* .8, *Sed & in pueris pulsus* .9, *Similiter in timore* .14, *Cor affirmant vulgo fontem* .16, *& tamen negant dextrum ventriculum spiritus facere* .16, An dexter ventriculus cordis spiritus faciat* .20, 1. .31, 2.

16.5, 3. .8, 4. .12, 5. .16, *Cum dicunt sinistrum* .20, *Quid est* .22, *Si tricuspides* .24, *Et quommodo* .25, *Et omnino*

17.1, *Amplius,* .10, *Si fuligines* .20, *Si quis experimentum Galeni* faceret (*De corde observationes et problemata varia per totum caput)

18.2, Aerem non deferri ad cor per arteriam venosam* .8, *Minus toleranda illa opinio* .10, *sanguinem* .11, *aerem* .11, Sanguinem a dextro cordis sinu in sinistrum per caecos poros non transudare* .16, *Sed si adessent foramina,* .21, *At mirum* .23, *Et cur quaeso pro* .29, *Praeterea* .32, *Quod notatu dignissimum*

19.6, *Ego autem non possum non mirari*

21.34, *Haec manifestiora* .35, vi motus cordis in vivis animalibus deprehendatur*

22.9, Observationes in motu cordis* .22, *illo tempore, quo movetur cor albidioris* .22, Cor quando albidius .33, Causa albidinis cordis*

23.17, *Neque omnino admittendum illud; tametsi*

24.1, *Neque verum est similiter,* .29, Quando arteriae replentur et distenduntur* .29, *Ex his videtur manifestum contra communia dogmata* .30, *& arterias repleri & distendi**

25.23, Pulsus arteriarum unde*

26.17, *Sic prius desinit cor pulsare, quam auriculae,* .17, Initium motus de auriculis* .19, *ultimo* .25, Dextra auricula ultimo moritur* .36, Ex pulsu auricularum sanguinem in ventriculos cordis protrudi* .36, *Auriculae enim dum moventur*

27.1, Causa albedinis auricularum* .6, *In piscibus, & ranis,* .10, *At vero* .11, *Cor anguillae,* .20, *In Columba* (*observationes autoris de motu cordis in diversis animalibus) (.23 Read adds *quum* after *fomento* to improve sense in *Quo fomento quasi vires, & vitam postliminio recuperasset, . . .)* .31, *Tale quiddam*

28.28, Omnia animalia cor habere.* .28, *In exanguibus vero* .34, *Sed notandum & hoc*
29.1, Notandum insuper .10, Est hic apud nos .17, *In ovo Gallinaceo* .29, *Primum* .34, ventriculus
30.14, *Sic etiam in deglutitione radicis,* .21, Deglutitionis modus. (*Sanguis ut in ventriculos cordis protudatur)
33.35, *In foetu*
34.1, *Primus contactus,* .16, Vasorum cordis in embrione numerus et cohaesio .19, *Altera unio est*
35.25, *Dexter* .28, *Sinister similiter*
37.1, *In perfectioribus* .1, Quibus viis sanguis a dextro cordis sinu in sinistrum permeat (? permeet) * (*Sanguis a dextro in sinistrum sinum transitus)
39.10, Valvularum usus.
42.17, Cor. .25, *Hinc cum venae sint viae quaedam* .34, Venae et arteriae differentia.
43.26, Quantum sanguinis singulis pulsibus protrudatur in habitum corporis* .34, *Cor una* (*Sanguinis motus circularis)
(44.5, Read brackets *esto*).
44.13, *Sed esto* .28, *Quare concludendum,* .36,Quantitas sanguinis quae a corde protruditur (*Sanguinis motus circularis)
(45* Sanguinis motus circularis)
(46* Quantum sanguinis uno pulso a corde propellatus. Sanguinem moveri a circumferentia ad centrum)
47.1, *quod sanguis* .5, *Verum si quis hic dicat* .5, ob. .i. .10, Resp. .13, *Sin vero* .13 ob. ii. .18, *Respondendum* .18, Resp. .23, *Sed in serpentibus* .23, Experimentum .24, i. .28, i. .28, ii. .28, *Haec omnia uno exemplo confirmantes,* (*Sanguinis motus circularis)
48.4, *Contra statim soluta vena,* .12, Mortis causae duae
49.8, *Strictam* .8, Ligaturarum duae, i. .15, *Mediocrem* .15, ii .26, *Facta itaque stricta ligatura* .26, Experimentum.
50.7, *Si quis*
51.8, *per venas influente non posse, patet;* .18, *quem ego frigidi sanguinis recursum* .18, Cur in phlebotomia syncope non raro obtingat.* .23, *Praeterea,* .25, Signum est .28, *Item signum est*
54.14, *Amplius observandum,* .15, *Nam recte* .17, *tamen si timor* .17, i. .25, ii. .25, *Ex contrariis* .28, Quae impediant quo minus in phlebotomia sanguis pleno cursu prosiliat. (*Sanguinem moveri a circumferentia ad centrum)
55.1, Quibus viis ab extremitatibus ad centrum deferatur. .5, Valvularum in venis inventores. .10, Earum situs. .11, *Sitae sunt* .19, *non est enim* .19, Refellitur harum valvularum usus ab aliis propositus. .32, *Nec ut sanguis* .36, *Nec ut*
56.3, *Sed omnino vavulae factae sunt,* .3, i. .5, ii. .10, Verae causae valvularum in venis.* .11, *Ego illud saepissime* .14. *contra vero* .23, Experimentum. .37, Sanguinem per venas in cor fluiri, non autem contra.
(58* Sanguinem moveri a circumferentia ad centrum)
59.16, *Videmus* (.18, Read substitutes *contrahat* for *consistat*). (.28, Read adds restituerentur after imbuto for the sake of clarity). .31, Cordis dignitas.
60.9, *Praeter haec* .17, *cum cor* .17, Cordis substantiam esse locum perfectionis alimenti. i. .21, ii. .21, *Amplius* .26, *Tum ultra* .26, iii. .32, Sanguinem moveri a circumferentia in centrum.*

61.1, Regressum sanguinis ab extremitatibus ad cor prompta quorumdam problematum solutione demonstrari posse.* .6, *uti lues venerea* .6, i. .8, *vulnere facto a morsu canis rabidi,* .8, ii. .12, *In tertiana febri,* .12, iii. .19, *&fit paroxysmus febrilis* .19, Causa paroxysmi febrilis .22, *Cur etiam* .30, *In mesenterio etenim sanguis,* .30, Chylum sursum; sanguinem deorsum contrariis motibus per easdem venas uno eodemque tempore non ferri.*

62.13, Chylus quomodo tingatur ut sanguinis formam acquirat.* .14, *Natura iecur apposuit* .16, *Hinc in embryone* .19, Jecoris usus.* .28, In embryone exiguum esse hepatis usum. .29, *Sed in ovo* .30, *alterum* .32, consequi: .37, Vasa pullum in ovo nutrientia.

63.25, *Est unum* .26, Observatio Anatomica de circulatione ramorum derivatorum a ramo splenico.* .27, *A Ramo*

64.18, Quae cor non habeant. .20, *In plurimis et pene omnibus* .23, *etiam in pediculis* .30, Quandam particulam pulsantem auriculas cordis representantem in quibusdam reperiri. .31, *In his ita se habet ista particula*

65.7, Differentia cordium in animalibis. .19, *Et insuper 6.26, Sinistri ventriculi dignitas et officium.* .34, *Notandum vero*

66.18, Lacertulorum in corde usus. .26, Horum in corporibus diversitas. .31, *Quibusdam* .35, *proinde dextro ventriculo* .36, Animalia quaedam fibris cordis carent.

67.3, *Et hinc etiam* .3, Substantia sinistri ventriculi cordis. .7, Quomodo conjiciendum de cordis substantia ex habitu corporis. .12, *Valvularum similiter* .14, Valvularum sigmoidarum usus. .17, *Tricuspides* .21, Usus tricuspidum seu mitralium. .30, *necessario* .22, Aves ventriculos cerebri non habere.

68.8, Crabrones . . . per caudas respirare. .18, Auricula cordis dextra primum vivens et ultimum moriens.

69.12, *Sed notandum* .12, Auriculae in foetu magnae. .18, Cordis fabrica in foetu.

70.9, fibrarum in cordis fabrica differentiae et usus. .10, *Necminus Aristoteli* .22, Cor omnium corporis partium princeps. .25, Probl. i. .29, ii. .38, Cur arteriarum tunicarum in extremitatibus rariores, quam in trunco.

71.21, Cur venae arterialis non ita crassa sit tunica ac aortae? .35, Cur pulmones tam ampla habeant vasa. .36, *Amplius cur pulmones*

72.4, *est* .11, *Cur denique vena arteriosa dicta,* .11, Cur similis sanguis in sinistro et dextro cordis sinu. .13, Cur vena arteriosa, arteriae arteria venosa venae constitutionem habeat.

APPENDIX 2

Read's Library

Bauhin, C., *Theatrum anatomicum,* (de Bry, publisher) 1621.
Bauhin, C., *Vivae imagines partium corporis humani,* (de Bry) 1620.
Bauhin, C., *De hermaphroditorum monstrosorumque partuum natura,* Basle, 1609.
Bauhin, C., *De compositione medicamentorum,* 1610.
Beguinus, J., *Tyrocinium chemicum,* 1625.
Boot, A.B. de, *Gemmarum et lapidum historia,* Leiden, 1636.
Brunfels, O., *Catalogus illustrium medicorum,* Strassburg, 1530.
Casserius, J., *Tabulae anatomicae,* Frankfurt, 1632.

Claudinus, *Tractatus* (included in Lautenbach, q.v.)

Cotta, J., *A Short Discovery of the unobserved Dangers of Severall sorts of ignorant and unconisderate Practisers of Physicke in England,* London, 1612.

Crollius, O., *Basilica chemica,* Geneva, 1631.

Crollius, O., *Tractatus de signaturis internis rerum,* Geneva, 1631.

Du Chesne, J., *Pharmacopoea dogmaticorum restituta,* Frankfurt, 1615.

Du Laurens, A., *A Discourse of the Preservation of the Sight,* London, 1599.

Du Pinay, A., *Historia plantarum,* Lyon, 1567.

Epiphanius, *Empyrica* (? lacks t.p.)

Fabricius, H., ab Aquapendente, *Opera chirurgica,* Frankfurt, 1620.

Fonseca, R., *Consultationes medicae,* Venice, 1620.

Frambesarius, N., *Schola medica,* Leiden, 1628.

Frambesarius, N., *Opera medica,* Frankfurt, 1629.

Galen, *De ossibus ad tyrones,* Frankfurt-am-Main, 1630.

Gallus, P., *Bibliotheca medica,* Basle, 1590.

Ganivetus, J., *Amicus medicorum,* Lyon, 1550.

Gilbertus Anglicus, *Compendium medicinae,* n.d. (1510).

Gorraeus, J., *Definitionum medicarum libri xxiiii,* Frankfurt, 1601.

Grevin, J., *De venenis,* Antwerp, 1571.

Hartmann, J., *Disputationes chymico-medicae,* Marburg, 1614.

Harvey, W., *De motu cordis,* Frankfurt, 1628.

Heurnius, J., *Praxis medicinae,* Leiden, 1590.

Heurnius, J., *De gravissimis morbis mulierum,* 1607.

Heurnius, J., *De morbis ventriculi,* 1608.

Heurnius, J., *De morbis qui in humani capitis insidere consueverent,* Leiden, 1594.

Hildanus, F., *Lithotomia vesicae,* London, 1640.

Hippocrates, *Opera,* Venice, 1575.

Hippocrates, *Prolegomena et prognosticorum libri tres,* Leiden, 1597.

Hippocrates, *Aphorismi,* 1611.

Hippocrates, *Aphorismi Soluti et metrici,* Cambridge, 1633.

Hofmann, C., *De thorace,* Frankfurt, 1628.

Hofmann, C., *De generatione hominis,* Frankfurt-am-Main, 1629.

Hofmann, C., *De formarum origine,* Frankfurt-am-Main, 1629.

Hofmann, C., *Commentarii in Galeni de usu partium corporis humani,* Frankfurt-am-Main, 1625.

Horstius, G., *Concilliator enucleatus,* Giessen, 1621.

Indaginis, J., *Introductiones apotelesmaticae,* Frankfurt, (?1560)

Ingrassia, J., *Quaestio de purgatione per medicamentum,* Venice, 1568.

Johnson, T., *Iter plantarum,* London, 1629.

Knobloch, T., *Disputationes anatomicae et psychologicae,* 1612.

Lambye, B., *A Revelation of the Secret Spirit,* London, 1623.

Lautenbach, J., *Consilia medicinalia,* Frankfurt, 1605.

Libavius, A., *Alchymia,* Frankfurt, 1606.

Libavius, A., *Commentariorum alchymiae . . . pars prima,* Frankfurt-am-Main, 1606.

Liddel, D., *De febribus,* Hamburg, 1610.

Liddel, D., *Ars medica,* Hamburg, 1607.

(Man, T.), *A Treatise, wherein is declared the sufficiencie of English Medicines,* London, 1615.

Marinellus, J., *Commentaria* (in *Opera* of Hippocrates, q.v.)

(Martinus, G.,) *Philosophiae chemicae iv vetustissima scripta,* Frankfurt, 1605.

Massaria, *Tractatus quator utilissimi,* Frankfurt, 1608.

Mercurialis, H., *De compositione medicamentorum,* Frankfurt, 1591.

Mercurialis, H., *De oculorum et aurium affectibus,* Frankfurt, 1591.

Mercurialis, H., *De morbis mulieribus,* Venice, 1591.

Mercurialis, H., *De arte gymnastica,* Venice, 1601.

Mercurialis, H., *De pestilentia,* Venice, 1601.

Mercurialis, H., *Tractatus de maculis pestiferis,* Venice, 1601.

Mercurialis, H., *De venenis,* Venice, 1601.

Mercurialis, H., *De decoratione,* Venice, 1601.

(Molitor, J., A collections of theses, some medical).

Monardes, N., *The three bookes written in the Spanish tongue . . . ,* London, 1577.

Moufet, T., *Insectorum . . . theatrum,* London, 1634.

Muller, P., *Miracula et mysteria chemico-medica,* 1616.

M., I., *The Generall Practise of Medecine,* Edinburgh, 1634.

Nicandros, of Colophon, *Alexipharmaca,* Paris, 1549.

Nieremberguis, J., *Historia naturae,* Antwerp, 1635.

Nonnus, L., *Ichtyophagia,* Antwerp, 1616.

(Paracelsus) *De obscuriorum locorum et vocum in scriptis Paracelsi* . ., in Hartmann, q.v.

Parkinson, J., *Paradisi in sole paradisus terrestris,* London, 1629.

Peucer, C., *De febribus,* Frankfurt, 1614.

Phioravanti, L., *A Discourse upon Chyrugery,* London, 1626.

Planer, A., *Orationes tres,* Tübingen, 1579.

Porta, J.-B., *De miraculis rerum naturalium,* Antwerp, 1560.

Primerose, J., *Exercitationes in librum de motu cordis,* London, 1630.

Priscianus, T., *Phaenomenon euporiston,* Basle, 1532.

Read, A., *A Treatise of the First Part of Chirurgerie,* London, 1638.

Read, A., *The Secund Part of the Anatomie of the Body of Man,* 1633.

Read, A., *A Description of the Body of Man,* London, 1634.

Renodaeus, J., *Dispensatorium medicum,* Frankfurt, 1615.

Riolan, J., *Comparatio veteris medicinae cum nova,* Paris, 1605.

Riolan, J., *Ad Libavi maniam . . . responsio,* Paris, 1606.

Riolan, J., *Brevis excursus in battologiam Quercetani,* Paris, 1604.

(Riolan, J.), *Apologia pro Hippocratis et Galeni medicina . . . ,* Paris, 1603.

Rousset, F., *Foetus vivi ex matre viva,* Basle, 1591.

Rulandus, M., *Lexicon alchimiae,* Frankfurt, 1612.

Schenck, J., *Observationum medicarum . . . volumen,* Frankfurt, 1609.

Scholz, L., *Consiliorum medicinalium . . . liber,* Frankfurt-am-Main, 1598.

Scholz, L., *Epistolarum philosophicarum . . .,* Frankfurt-am-Main, 1598.

Scholz, L., *Aphorismorum medicinalium . . .,* Breslau, 1598.

Schwenckfeld, C., *Theriotrophaeum Silesiae,* 1603.

Schylander, C., *Medicina astrologia,* Antwerp, 1577.

Sennert, D., *Physica hypomnemata,* Lyons, 1637.

Sennert, D., *Institutiones medicinae,* Witteburg, (?1628)
Sennert, D., *De febribus,* Witteburg, 1628.
Sennert, D., *Practica medicina,* Lyon, 1629.
Sennert, D., *Practicae medicinae liber secundus,* Lyon, 1630.
Sennert, D., *Practicae medicinae liber tertius,* (?Lyon) 1631.
Sennert, D., *Practicae medicinae liber quartus,* Witteburg, 1632.
Sennert, D., *De arthritide,* Witteburg, 1631.
Sennert, D., *De chymicorum cum Aristotelicis et Galenicis consensu et dissensu,* Witteburg, 1629.
Spigelius, A., *De humani corporis fabrica,* Frankfurt, 1632.
Taliacotius, G., *De curtorum chirurgia,* Venice, 1597.
Uffenbach, P., *Thesaurus chirurgiae,* Frankfurt, 1610.
Valleriolus, F., *Loci medicinae communes,* Lyon, 1562.
Venustus, A., *Consilia medica,* In Lautenbach, q.v.
Vesalius, A., *Paraphrasis in nonum librum Rhazae,* Basle, 1537.
Walaeus, J., *De motu chyli,* (?1632)
Wigand, J., *Vera historia de Succino Borussico,* Jena, (?1590).

ABANDONED CHILDREN OF IMPERIAL RUSSIA: VILLAGE FOSTERAGE*

DAVID L. RANSEL

Russian reformers have frequently introduced grand schemes for human development only to have intractable social conditions turn their expectations in unforeseen directions. This was clearly the case with reforms introduced under Catherine II (1762–1796) to deal with child abandonment and infanticide. In establishing central foundling homes at Moscow and St. Petersburg, she projected a sophisticated plan of human resource management designed to build unwanted children into a corps of enterprising urban dwellers, the "third estate" that Russia so sorely lacked. Despite the best intentions, this ambitious undertaking ended up producing not a new urban estate but a vast and unmanageable system of village fosterage which peasant women shrewdly exploited to support themselves and their families. The supposed objects of charity, the children, came to function as a medium of exchange between the city and village, the agency by which peasants could draw a cash stipend from the urban welfare institutions. But the villages incurred a cost as well. As flesh and blood, the children carried more than monetary value: they also bore disease from the urban centers to the villages and in other ways disturbed the fabric of village life. In short, a well intentioned scheme for turning unwanted children into productive citizens worked itself out instead into a costly human traffic between town and village.

The purpose of this essay is to sketch a brief introduction to the Russian system of village fosterage and to contrast some important social and medical consequences of this system with the original optimistic expectations of those who established the foundling homes. The discussion should, however, begin with a look at the wider context of European development, for Russia was not alone among European countries in experiencing socially disruptive levels of child abandonment in the eighteenth and nineteenth centuries. The problem was continent-wide. The steady rise of European

---

* Presented at the 50th anniversary meeting of the American Association for the History of Medicine, Philadelphia, May 2, 1975. Financial support for research on this topic was provided in part by the American Council of Learned Societies, the University of Illinois Russian and East European Center and Center for Comparative International Studies.

BULLETIN OF THE HISTORY OF MEDICINE 50 501-510 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

population and accompanying urban concentration everywhere increased the incidence of and attention to the age-old problems of child exposure and abandonment. At the same time, mercantilist economic doctrine, with its stress on the preservation and expansion of national population, on the one hand, the humanist revolt against cruel treatment of unwed mothers on the other, combined to encourage government and private charities to take positive action. As a result foundling homes began springing up all over Europe.[1] Russia shared the same general pattern of population growth and urbanization with its attendant problem of child abandonment. Since reform-minded Russians regularly looked to the west for social and technical ideas, it was natural that Western practices would exert an important influence in this area. Indeed, the establishment of foundling homes in Russia followed closely their development in Europe, and in this as in many other undertakings. Russians adopted the biggest and most highly centralized of Western models, the so-called "Latin system" of France and southern Europe, characterized by a few very large metropolitan foundling institutions. The only difference was that Russia took up the task in Catherine II's reign at the height of the Enlightenment and incorporated the latest educational theories in a way that gave the enterprise a utopian dimension unlike anything contemplated in the West.

Prior to Catherine II's time (1762–96) foundling care had existed in Russia on only a very small scale and was concerned solely with saving children's lives. No thought was given to securing the foundlings a productive and satisfying adult occupation.[2] In contrast, the two large homes established by Catherine at Moscow and St. Petersburg began as part of a great social vision. Their designer, I. I. Betskoi, contemplated an unprecedented experiment in child rearing. Deeply imbued with Enlightenment optimism about the ability of education to shape a new humanity, he planned to mold unwanted children into an altogether new class of enlightened, free urban dwellers. The idea was to accept only youngsters beyond the weaning stage, the survivors of provincial foundling shelters, and then to train them in urban occupations, polite manners, and the essentials of rational thought. Upon

[1] On the history of European foundling homes, the studies of F. S. Hügel, *Die Findelhauser und das Findelwesen Europas* (Vienna, 1863) and Léon Lallemand, *Histoire des enfants abandonnés et délaissés* (Paris, 1885), are still unsurpassed for breadth and detail. An excellent recent article on the Paris home is Claude Delasselle, "Les enfants abandonnés à Paris au XVIII^{e} siècle," *Annales ESC,* Jan.-Feb. 1975, *30* (1): 187–218. On the humanist revolt Oscar Werner's *The Unmarried Mother in German Literature* (New York, 1917).

[2] L. N. Petrov, "Blagotvoritel'nost' do Petra Velikogo," *Vestnik blagotvoritel'nosti,* 1898, no. 8, 1–40; A Piatkovskii, "Nachalo vospitatel'nykh domov v Rossi," *Vestnik Evropy,* 1875, no 6. 268–72.

reaching maturity they would, ideally, marry from among their classmates, set up home and shop in the cities, and rear children of their own in the same enlightened spirit, expanding their numbers to the benefit of the state and society. Village fosterage was to play no part in this system. Quite the contrary, Betskoi had observed this practice firsthand in western Europe and found it entirely at odds with his scheme. He proposed instead to keep children in an urban institutional setting under the supervision of carefully selected staff. He wanted them isolated as effectively as possible from the corrupting influence of the external environment.[3]

The great irony was that in implementing his plan Betskoi introduced changes that led the homes in a direction altogether contrary to his original hopes. The decisive change was a lifting of the prohibition on the entry of newborn babies. The plight of abandoned and murdered infants apparently so moved Betskoi that he could not find it in his heart to exclude them. In fact, he went to some lengths to insure that the prejudices of priests and police would not pose a barrier to unwed mothers wanting to deliver their babies to the homes.[4] This humanitarian concern produced the desired result, but at the same time it subverted the original goal of training a new type of enlightened urban dweller. The homes were quickly swamped by a stream of infants whose care provoked daily crises and distracted the personnel from other efforts. Instead of training a manageable number of already weaned youngsters, the staff had to struggle heroically just to keep a small percentage of the babies alive. Mortality rates soon soared into the high ninety percent range and effectively demonstrated the futility of nurturing large numbers of infants in an institutional setting.[5] The dream of isolating the children from the surrounding social reality turned into a cruel mockery. There could be no moral salvation without physical survival. The only hope therefore lay in sending the infants out to nurse. The foundling home authorities had to compromise their educational goals and begin dispatching the children to peasant villages for care and feeding.

---

[3] I. I. Betskoi, *General'noi plan Imperatorskogo Vospitatel'nogo doma v Moskve*, parts 1–3 (St Petersburg, 1763–67); P. M. Maikov, *Ivan Ivanovich Betskoi, opyt ego biografii* (St. Petersburg, 1904).

M G.***, "O vospitatel'nykh domakh v Rossii," *Arkhiv sudebnoi meditsiny*, 1868, no. 4, 109, 111, 1869, no. 1, 79–80; Piatkovskii, "Nachalo," 275–77, 284–87, 298–99, 301–02; A. I. Zabelin, *Vekovye opyty nashikh vospitatel'nykh domov* (St. Petersburg, 1891), 17.

[5] In the most startling case the Moscow home lost 98 percent of the 1089 children deposited with it in 1767 A smallpox epidemic made this a particularly bad year, yet mortality rates long remained in the 80 to 90 percent range. Despite attempts to mask these statistics, a knowledgeable observer like Thomas Malthus (who visited the Russian homes around the turn of the century) easily grasped the true condition of foundling care and evaluated the work of the homes as a form of institutionalized infanticide. *Essay on the Principle of Population*, 7th ed. (London, 1872), 151

At first the program of village fosterage was modest, in accord with the number of children coming to the homes. At the end of the eighteenth century this was just over 2,000 at the Moscow home and between 1,500 and 1,600 at the St. Petersburg home. But the next century saw a steady rise in the number of children abandoned to the homes and consequently the number residing in villages likewise reached sizable dimensions. To give a clear idea, by the 1880s the Moscow home alone was receiving between 16,000 and 18,000 infants annually and sending over 10,000 of these each year to outlying district villages for care. In 1882 there were all told 41,720 foundlings from the Moscow home living with 32,000 foster families scattered throughout 4,418 villages. A dozen villages had over 90 fosterlings each.[6] Similar programs, on a smaller scale, were operating from the St. Petersburg home and several provincial foundling shelters.

These figures represent only the movement from urban foundling home to peasant village. There was a significant flow from countryside to town as well. Fully 45 percent of the children delivered to the Moscow foundling home came from outside the city: 20 percent from Moscow province (*guberniia*) and 25 percent from more distant provinces.[7] In other words, a large two-way traffic had developed between town and country. "Traffic" is the proper term, since children functioned as items in a commercial transaction. For example, with respect to the delivery of the children to the foundling home, while they often arrived individually in the arms of mothers or midwives, there were also whole cartloads regularly trucked in by women known as *kommissionerki*. These enterprising women collected unwanted children in the villages and district towns, cared for them temporarily, usually in squalid conditions, and then when enough had been gathered to make the journey profitable, they packed the infants into a wagon and hauled them to the metropolitan foundling home. Fees for this service were substantial and reportedly provided the *kommissionerki* with a comfortable living.[8]

Once the children arrived at the home they were "processed." Each one received an identifying number, a medical examination, and, if necessary, baptism. They were then turned over to a resident corps of wet-nurses for care and feeding. However, their stay in the home was brief, usually no more than a few weeks, since over-crowding made it necessary to send them out to peasant villages as soon as possible. The pay for such care was substantial, and the homes attracted a large, if not always adequate supply of village women eager to take the foundlings. The fees received by the women constituted an important supplement for many peasant households; in some areas this was the major source of non-farm income. At the height of the foundling traffic approximately 12,000 wet-nurses arrived annually to pick up children at the Moscow home.[9] As one Moscow zemstvo doctor remarked, noting the poor care of many children in the villages, "the majority of new mothers from our area do not think merely of how best to nurse their baby but how they might draw the greatest advantage from their breast milk; this unfortunate phenomenon is expressed . . . by becoming wet-nurses or by taking a foundling, and sometimes not just one but several."[10] The doctor might have added that many of these same women were giving their own babies to the foundling home in order to sell their milk. As noted above, 45 percent of the children delivered to the home (i.e. between 7,000 and 8,000 annually at the Moscow home) originated in the rural communities outside the city, the very areas from which the wet-nurses came.

---

[6] N. F. Mikhailov, "K voprosu o vliianii pitomnicheskogo promysla na krest'ianskoe naselenie," *Trudy vos'mogo gubernskogo s"ezda vrachei moskovskogo zemstva (sent. 1885),* (Moscow, 1886), 136–37. For a detailed breakdown of pre-1860 figures for the Moscow home, see *Materialy dlia istorii imperatorskogo moskovskogo vospitatel'nogo doma,* ed V. Drashusov (2 vols., Moscow, 1863), vol. 1, part 2, 1–37, esp tables on 6, 22, 29, 35 [hereinafter as *MIMVD*].

[7] Mikhailov, "K voprosu o vliianii," 136.

[8] As railways developed the women adopted the new technology for more rapid transport of their wares. This bold step, however, exposed the appalling conditions of the children's care to wider view and sparked a public outcry. *Russkie vedomosti,* 31 May 1887, no. 147; *Detskaia pomoshch',* 1887, no. 23, 754; Tolstoi gave a very accurate description of this commerce in his novel *Resurrection:* as might be expected, for he used many contemporary news items in composing this work.

The most noteworthy effect of farming the children out to foster families in the villages was a reduction of mortality rates in the metropolitan homes from the 80 and 90 percent range in the late eighteenth century down to a respectable 20 or 30 percent level in the mid nineteenth. This was a major achievement from the point of view of the foundling home administration. It did not, however, do much to improve a foundling's chance of survival. The carnage simply shifted from the urban homes to the villages. The overall mortality among Russian foundlings remained above 75 percent through most of the nineteenth century.[11]

The reasons for this excessive mortality were several, and in great measure they were bound up with the causes for the generally high childhood mortality in Russia, which in the mid-nineteenth century ran over 50 percent (though with wide regional variation, reflecting a more favorable situation in the western provinces and increasing mortality as one moved to the central and eastern provinces.) An etiological study commissioned by the Society of Pediatricians in 1886 pinpointed the chief causes of infant mortality in the rural areas as the heavy work burden and physical weakness of parents, abuse of alcohol and tobacco, dirty air and general lack of hygiene in domiciles, diet lacking in meat and milk, harmful customs and rituals, insufficient access to medical care and small-pox vaccination, migrant labor patterns, and lack of supervision for children while parents were working.[12] This last was considered an especially great killer in the villages, since a very marked rise in infant mortality occurred during the summer months when women were at work in the fields. Provincial doctors frequently decried the common practice of leaving infants all day either alone or in the care of small children and with nothing to satisfy their hunger but a chewing rag filled with bread or kasha and dampened by spittle.[13] Even when the women were present, doctors reported, they were often too ill-fed themselves to nurse adequately, and in many cases they moved the children on to hard food during their first days with fatal results. Russian nurture was apparently greatly inferior to that of such "backward" peoples of the empire as the Tatars and Udmurts, who nursed on demand, weaned late, and consequently showed a much lower incidence of infant mortality.[14]

---

[9] Mikhailov, "K voprosu o vliianii," 137, in the first half of the nineteenth century the pay fluctuated between 2 and 5 rubles per month. When the required number of wet-nurses fell off, the homes raised the fees until the deficit was made up, although the fee scale climbed regularly through the century, fluctuation occurred due to changes in the specie base of the currency. For details, see *MIMVD*, I, 98, 108, 112, 114.

[10] V N. Benzengr, "K voprosu o pitanii grudnykh detei i ob ukhode za nimi," *Trudy, chetvertyi gubernskii s''ezd vrachei moskovskogo zemstva (okt-noiab 1879 g.)* (Moscow, 1880), 139.

[11] Zabelin, *Vekovye opyty*, 23.

Despite the great outcry against summer field work, the deadly effects of parental absence in the summertime were probably exaggerated. Statistics indicate that infant mortality in urban areas likewise reached its highest levels during the summer. The rates differed only in that the peak period for the cities was early summer, for the countryside late summer.[15] This suggests that the real killer was disease bred in the city and subsequently carried into the rural areas. While the neglect occasioned by field work no doubt increased the village children's susceptibility to disease, an understanding of the problem of mortality in the villages would seem to require instead some investigation of the transmission belts that carried disease from town to country. While many routes can be pinpointed (there was considerable movement to the countryside during the summer season),[16] the delivery of foundlings from the urban homes to the villages was unquestionably an important one. It is naturally much more difficult to determine the precise impact of the foundling traffic on the health and social stability of the villages in which the children were fostered.

---

[12] *Detskaia pomoshch'*, 1886, no. 13, 529–30. V. T. Demich, "Pediatriia u russkogo naroda," *Vestnik obshchestvennoi gigieny* 1891, *11* (2): 126–29, says that infant mortality was 50 percent; perhaps he was referring only to villages. Other sources indicate that the 50 percent plus figure related to childhood mortality (i.e., up to 5 years of age). A. D. Liubavskii, *Iuridicheskie monografii i issledovaniia*, IV (St. Petersburg, 1878), 46–47; *Detskaia meditsina* 1901, no. 3, 257–58; *MIMVD*, I, 43.

[13] D. E. Gorokhov, *Detskii organizm v bor'be s bolezniami i smert'iu* (Moscow, 1910), 4–5, 8; *Detskaia pomoshch'*, 1892, no. 13, 461–62; *Detskaia meditsina*, 1901, no. 3, 25–58

[14] *MIMVD*, I, 16, *Detskaia meditsina*, 1901, no. 3, 257; Gorokhov, *Detskii organizm*, 8; see also V. O. Gubert's report with valuable statistics in *Trudy obshchestva detskikh vrachei v S.-Peterburge za 17 (1902) i 18 (1903) gody* (St. Petersburg, 1904), 19–24.

[15] Month by month breakdown can be followed in the *Ezhemesiachnyi statisticheskii biulletin goroda Moskvy*. I want to thank my colleague Diane Koenker for bringing these tables to my attention.

This issue had nonetheless clearly begun to trouble administrators by the middle of the nineteenth century. In 1857, for example, the governor-general of Finland (then part of the Russian empire) strongly protested the traffic from the St. Petersburg foundling home to his area and complained that it was destroying the social fabric of his rural communities. He wanted the traffic stopped and cited the following reasons:

> (1) Syphilis is spreading in these areas as a result both of the foster children communicating it to their wet-nurses and of nurses infecting the children; (2) unmarried women are openly prostituting themselves in order to become wet-nurses; and (3) peasant wet-nurses, wishing to take advantage of this commerce as long as possible, devote their chief energies to caring for the foster children and leave their own children without supervision.[17]

It would be useful to know the extent to which these criticisms were justified.

The comment about syphilis might at first appear to be a simple matter of prejudice. Syphilis was quite common in Russian villages and need not be explained by way of the foundling traffic.[18] However, research by provincial doctors showed a definite connection between the foundlings and the spread of syphilis. This came out in a general way in evidence of higher syphilis rates among foster mothers than among the population as a whole and in obvious jumps in the rates of syphilis in districts recently opened to the foundling traffic. The doctors pinpointed the source of the disease by the appearance of chancres on the foster mothers' breasts. Detailed case studies traced the spread of the disease in this fashion. One study told of a 40-year-old wet-nurse who contracted syphilis from a foundling in the form of a breast chancre. The child soon died, and in order not to lose her milk the woman began nursing three of her neighbors' children, all of whom subsequently contracted the disease. The children in turn infected their three mothers, giving them all breast chancres, and the mother of one child passed the scourge on to her husband. The investigation stopped at this point, although presumably the chain of infection did not. In another case study of eight women from the same rural district who had worked at the St. Petersburg foundling hospital and contracted syphilis, it was discovered that after returning to their villages they spread the disease among sixty additional persons.[19] If these reports can be believed,[20] it seems that on this issue the Finnish governor-general clearly had a strong argument.

---

[16] In addition to the great exodus of the well-to-do to summer at their estates and dachas, 18 percent of the Moscow work force regularly returned to home villages during the summer (in the food products industry 38 percent of the workers did summer field work). Report from 1891 in A. G. Rashin, *Formirovanie rabochego klassa,* p. 566, as cited in Diane Koenker's dissertation in progress for University of Michigan, working title, "Moscow Workers in 1917."

[17] Cited in article on foundling homes in *Entsiklopedicheskii slovar'* (Brokgauz-Efron) (St. Petersburg, 1892), VII, 280.

[18] *MIMVD,* II, 126–28; on history of syphilis in Russia, see interesting study by G. M. Gertsenshtein, *Sifilis v Rossii, materialy k meditsinskoi geografii i statistike Rossii* (St. Petersburg, 1885).

His second observation about unmarried women prostituting themselves to become wet-nurses is more difficult to judge. This is the first such reference I have encountered in either Russian or Western sources. Given the substantial fees sometimes paid by the homes for nurses, it is not surprising that women in very poor villages found them attractive enough to turn to this means of supporting themselves. But there was a much more common abuse that accomplished the same objective, and, unfortunately for the foundlings, delivered them into the hands of women who had no breast milk whatever. The usual method involved a conspiracy among several women of a single village. When one of their number gave birth, she collected the passports of three or four of her neighbors and set out for the metropolitan foundling home. There she appeared for a medical inspection, and the doctor, after determining that she was healthy and possessed an adequate supply of milk, assigned her a foster child to nurse. The same women would then return to the home on several occasions, each time with a different passport, and the doctor, who was not always the same person and in any case overburdened with work, would simply inspect her again and present her with another child. After collecting several children, the woman returned to her village and distributed them among her associates who then received regular monthly payments from the foundling home until it was discovered on one of the infrequent inspection tours (twice yearly or less in the first half of the century) that the children had died.[21]

---

[19] Mikhailov, "K voprosu o vliianii," 139, 145–47; K. K. Tolstoi, "O lechenii sifilisa," *Trudy piatogo gubernskogo s"ezda vrachei moskovskogo zemstva (fevr. 1881 g.)* (Moscow, 1881), 175, 178–79; G. M. Gertsenshtein, "O zarazhenii kormilitsami detei sifilisom i obratno," gazeta Meditsina (St. Petersburg, 1891).

[20] One is always inclined to be suspicious of the zemstvo doctors' reports on this matter, since they obviously had an axe to grind and there are many eruptions they may simply have attributed to syphilis without a thorough investigation and analysis.

[21] *MIMVD*, I, 125–32, II, 128; *Detskaia pomoshch'*, 1890, no. 6, 200, "Detopromyshlenniki," *Otechestvennye zapiski*, 1865, no. 12.

As for the third objection by the governor-general about mothers neglecting their own children to care for foundlings, evidence of such behavior is recorded for some regions.[22] On balance, however, it appears that the foster children were the principal losers in this competition, since their mortality invariably exceeded that of village children. While the traffic undoubtedly harmed the village children as well, the extent of their suffering is difficult to determine. Demographic and sanitation studies commissioned by the Moscow zemstvo showed the highest infant mortality among village children to be in the townships (*volosti*) with the largest concentrations of foster children from the foundling home.[23] One study even presents a village by village breakdown that yields an impressive correlation between the number of foster children and mortality of village children.[24]

TABLE 1

Percentage of fosterlings per 100 native villagers		Percent mortality among village children up to one year old in relation to births
Zolot'kovo	3.5	14.3
Polachevo	8.5	36.3
Merchalovo	13.0	40.0
Denis'evo	26.0	44.4
Modenovo	43.0	87.5

While seemingly compelling, these figures lose some of their value when one recalls that foster children were concentrated most heavily in the poorest townships and villages, where one would expect to find high infant mortality rates.[25] Still, when these figures and observations are combined with information on the spread of disease and the inability of poorly-fed peasant women successfully to nurse two infants, it is probably safe to say that the presence of a large number of foster children adversely affected the survival chances of the village children.

---

[22] M—T, "Zemstvo i bezprizornye deti-podkidyshi," *Trudovaia pomoshch'*, 1905, no. 4–5, 406, Benzengr, "K voprosu o pitanii," 139; N. B. Meder, "Polozhenie pitomtsev Vospitatel'nogo Doma, nakhodiashchikhsia v derevniakh S-Peterburgskogo uezda," *Vestnik blagotvoritel'nosti,* 1898, no 11, 43–44; as might be expected, foundling home officials denied any adverse impact on village children *MIMVD,* II, 126

[23] The best known study was by P. A. Peskov, *Opisanie Durykinskoi volosti moskovskogo uezda v sanitarnom otnoshenii,* published as vol. 1, no. 3 of *Sbornik statisticheskikh svedenii po moskovskoi gubernii,* otel sanitarnoi statistiki (Moscow, 1879), see esp. 108–17, 151, 155–56. See additional commentary by D I. Orlov, "Ob uchastii zemstva v vospitanii detei," *Trudy piatogo gubernskogo s''ezda vrachei moskovskogo zemstva (fevr. 1881)* (Moscow, 1881), 250.

[24] P I. Zarin, "Bogorodskaia volost' Vereiskogo uezda v sanitarno-statisticheskom otnoshenii," *Piaty gubernskii s''ezd Vrachei moskovskogo zemstva, protokoly zasedanii i trud (fevral' 1881 g.)* (Moscow, 1881), 182–94, following table from 192.

Many more aspects of the foundling traffic need to be investigated and explained. But let me conclude these introductory remarks by emphasizing its character as a national economic complex. By the end of the nineteenth century the traffic had developed to the point that children were coming into the metropolitan homes not only from the capital cities and their surrounding provinces; they were being sent in from zemstvo shelters as far away as the Black Sea, the Volga basin, and even the Ural Mountains. Children poured in from all over the country, were processed, and then streamed out to fill the villages of central Russia. One can imagine the chagrin of I. I. Betskoi and Catherine II had they survived to see the fate of the institutions they began with such generosity and hope. Their vision of populating the towns with educated and civic-minded workers developed instead into a true commerce with unwanted children serving as the medium of exchange. It was not the commerce often seen in this period of the city feeding off the countryside. Rather in this case the needy countryside used the sanitary reforms of the city to draw urban resources for its own support. The metropolitan homes came to act as a depot and transfer point for a superfluous and embarrassing commodity accumulating in the capitals. Village women gathered up this waste product and disposed of it for a fee.

---

[25] On link to poverty, see Peskov study cited above (note 23) and M—T, "Zemstvo i bezprizornye deti-podkidyshi," 408. A debate on the effects of the traffic continued through the late nineteenth century between zemstvo doctors and foundling home officials. For comments and discussion of the problems involved in researching the issue, see A. G. Arkhangel'skaia, "Rezul'taty pervoi popytki po issledovaniiu vliianiia pitomnicheskogo promysla na zdorov'e naseleniia," *Trudy deviatogo gubernskogo s"ezda vrachei moskovskogo zemstva (sent. 1887 g.)* (Moscow, 1888), 270–81.

THE ORIGINS OF A MODERN CONCEPT OF MEDICAL SPECIALIZATION: JOHN MORGAN'S *DISCOURSE* OF 1765*

TOBY GELFAND

Modern medicine, perhaps to an even greater extent than other professions, is marked by elaborate subdivisions. As many as fifty-four medical specialties, subspecialties, and "special divisions of specialties" have been counted, and more are confidently predicted.[1] The extraordinary growth of specialization in medicine is largely a phenomenon of the twentieth century, but the trend may easily be traced back to the middle of the last century.[2]

When and where did modern medical specialization begin? Unlike many "origin" questions, this one may be answered without violating historical sensibilities. Most historians agree that a recognizably modern form of medical specialization first developed in early nineteenth-century Paris. In 1841, the German physician Wunderlich remarked: "The specialties in France are a curious phenomenon, which is found in Germany only occasionally and to a very limited degree. In former times only dentists, oculists and hernia surgeons existed, and they were despised. Now a specialty is the necessary condition for everybody who wants to become rich and famous rapidly. Each organ has its priest, and for some, special clinics exist."[3]

In his monograph on the subject of medical specialization, George Rosen linked the origins of the phenomenon with the new concept of disease introduced by early nineteenth-century Paris medicine. Breaking away from traditional humoral pathological theories, the leaders of the Paris school thought

---

* Revised and expanded version of paper presented at the 50th anniversary meeting of the American Association for the History of Medicine, Philadelphia, Pa , May 1, 1975. Subsequent versions were offered to the Section on Medical History of the College of Physicians of Philadelphia, Pathology seminar of College of Physicians and Surgeons, Columbia University, and seminar of Institute of the History of Medicine, Johns Hopkins University. I wish to acknowledge the helpful suggestions and criticisms by these groups and the following persons: R. Christian Johnson, Whitfield J Bell, Jr., Lloyd G. Stevenson, and Charles C Gillispie.

[1] K. L. White, "Patterns of Medical Practice," in *Preventive Medicine*, ed. D. W. Clark and B. MacMahon (Boston, 1967), p. 856. See also R. H. Ebert, "The Medical School," in *Life Death and Medicine A Scientific American Book* (San Francisco: Freeman, 1973), pp. 103-111.

[2] G. Rosen, *The Specialization of Medicine* (New York, 1944, Reprinted, New York, 1972).

[3] Cited in E. H Ackerknecht, *Medicine at the Paris Hospital, 1794-1848* (Baltimore. Johns Hopkins Press, 1967), p. 163. Ackerknecht notes that in 1845, specialists constituted approximately 12% of the total number of physicians in Paris.

BULLETIN OF THE HISTORY OF MEDICINE 50 511-535 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

of diseases as localized anatomical lesions which correlated with characteristic groups of symptoms and physical signs. The objects of medical knowledge thus became specific clinical-anatomical foci. This point of view encouraged the compartmentalization of knowledge and the concommitant development of specialized research, instruments, and professional structures.[4]

That medical specialties emerged in response to basic conceptual changes in medical theory (aided by broad demographic, economic, and social factors associated with the growth of urban centers) is undeniable. But this formulation overlooks an important aspect of the problem. Specialization and its kindred notion, the division of labor, have a history of their own apart from medicine. These concepts received a great deal of attention in late eighteenth- and nineteenth-century thought; they were of central importance in systems as diverse as Adam Smith's political economics, Charles Darwin's biology, and Emile Durkheim's sociology.[5] The origin of a concept of professional specialization thus may be logically and historically distinguished from the appearance and growth of medical specialties. To confuse the two or to assume that both occurred at the same time is to rule out the influence which the concept may have had on the phenomenon.

Concepts, of course, do not float around in a disembodied state. They are held by persons who usually have various interests in their preservation and propagation. This paper is concerned with physicians' concepts of specialization prior to the nineteenth century. It seeks to show that by the second half of the eighteenth century, physicians had abandoned traditional notions of professional roles and begun to think in a new way about how the medical task should be divided. The new way of thinking, it is suggested, made possible the subsequent rise of medical specialization in practice because a critical mass of leading physicians had already accepted the principle.

* * *

From the High Middle Ages down through the eighteenth century, three professional or corporate groups provided medical services—physicians, surgeons, and apothecaries. The three types of practitioners may be visualized as forming a triangle. At the apex perched the medical doctors, relatively few in number, while the broad supporting base consisted of surgeons on the one side and apothecaries on the other. Between the base and the apex lay a space containing differences in educational, social, and often legal status, differences between members of arts and trades guilds and liberal professionals of the university. Although each medical group corresponded to a traditional therapeutic modality (diet, drugs, and manual procedures or surgery), functional distinctions in fact depended upon intellectual and social rank. A physician of the Paris Faculty of Medicine put it this way in 1720:

---

[4] Rosen, *The Specialization of Medicine*, pp. 16-23

[5] C. Limoges, public lecture at Princeton University (10 Oct. 1975). See also Ackerknecht, *Medicine at the Paris Hospital*, pp. 163-164.

> The physician-architect, as Celsus calls him, must have general knowledge. He must be sufficiently versed in all the subservient parts of medicine so that he can delegate work to those subordinated to him, so that he can prescribe to each one his duty. The execution is left to the subordinates.[6]

A London physician of the same period stated that the medical art consisted of "three parts, whereof two were servile, Chirurgery and Pharmacy."[7]

The triangular model presents a highly simplified schema of professional relationships, one which corresponded more to physicians' perceptions than to objective reality. It applied to the medical professions only in Western Europe, and fitted better in some regions than in others, France better than Italy for example.[8] Practice came close to theory only in large cities, and there only in those particular situations where physicians were in ample supply, as in royal and noble households. Elsewhere, a single person, be he or she a barber-surgeon, apothecary-surgeon, midwife, or someone without any legal medical standing, tended to the various needs of the sick.[9]

---

[6] M -L. Reneaulme de la Garanne, *Discours pour l'ouverture de l'école de chirurgie, 1720* (Paris, 1725), p. 15.

[7] Cited in L. King, *The Medical World of the Eighteenth Century* (Chicago: University of Chicago Press, 1958), p. 6. See also B. Hamilton "The medical professions in the eighteenth century," *Econ. Hist Rev.*, 1951, *4:* 141-169 G. Clark, *A History of the Royal College of Physicians* (Oxford Clarendon Press, 1964), vol. 1, pp. 103-104, 124.

[8] Examples of individual physicians who practiced surgery can be found all over Europe, including members of the French medical faculties of Paris and Montpellier Especially in Italian university centers, it was not uncommon for a doctor of medicine to gain renown as a surgeon. See O Temkin, "The role of surgery in the rise of modern medical thought," *Bull. Hist. Med.*, 1951, *25:* 248-259, esp. 248-251 On the other hand, even in Italian cities, groups of barber-surgeons detracted from the status of surgery. Iconographical and other evidence indicates that dissection at the public anatomy lessons was relegated to barbers and other menials until Vesalius' reform in the mid-sixteenth century. See W. Heckscher, *Rembrandt's Anatomy of Dr. Nicolaas Tulp* (New York: New York University Press, 1958), pp. 46-49, 58-59, 182.

[9] For general discussions, see J. H. Baas, *History of Medicine*, trans. H E. Handerson (New York, 1889), vol. 1, pp. 322-346; vol 2, pp. 551-575, 730-799, and A. Castiglioni, *A History of Medicine*, trans. and ed. E. B. Krumbhaar (New York. Knopf, 1941), pp. 391-407, 568-569 The history of the provision of medical services in early modern Europe needs further investigation. J.-P. Goubert, *Malades et médecins en Bretagne, 1770-1790* (Paris: Klincksieck, 1974), a quantitative study of a relatively small locality, illustrates a fruitful approach for future research.

Nevertheless, the tripartite model remained influential. It provided an hierarchical unity for medicine. Having originated as part of a medieval world view in which knowledge as well as society conformed to similar hierarchies, the medical version survived into the eighteenth century, supported by physicians and, for the most part, accepted by apothecaries and surgeons. The substantial progress of apothecaries in seventeenth-century London did not upset this equilibrium. Although the apothecaries won the legal right to engage in general medical practice in 1703, they remained clearly subordinate as a group to the Royal College of Physicians.[10]

That an hierarchical conception in fact underlay apparently contradictory views of the medical professions becomes clear if we examine a debate which took place at Théophraste Renaudot's *Bureau d'Adresse* in Paris in 1638. The question under discussion was: "If more good or evil has arisen from the division of the parts of medicine among physicians, surgeons, and apothecaries."[11] Each side had a spokesman who raised a number of ultimately moot points. For example, one argued that a single individual, unlike three persons, could not shirk complete responsibility for the patient's care; the other countered that multiple responsibility protected the patient against involuntary or even willful negligence by any one party.[12]

But each side in the debate assumed that the physician-surgeon-apothecary relationship was hierarchical. The advocate for medical unity noted: "the physician represents the intellectual faculty, the surgeon, the vital, and the apothecary, the natural: to divide them is to seek to separate the liver, heart, and brain of the same man . . ."[13] His adversary responded that the ideal relationship resembled an harmonious "trio" in which the physician led the apothecary and surgeon as the head did the hands. To ask a physician to open a vein or reduce a fracture or to prepare a medication was tantamount to wanting a general to perform the functions of a common soldier at the same time as he issued commands:

> For the soul in repose is deemed wisest and most capable of reason. This is why judges are seated; physicians consult in the same manner, and the Greeks worshipped in this posture. What sort of advice could be expected from a physician always out of breath from his preparations or operations? Also, it would be indecent for a physician to touch his patients with his hands tainted with remedies he was preparing . . .[14]

---

[10] King, *The Medical World of the Eighteenth Century*, pp. 18-23

[11] T. Renaudot, *Recueil général des questions traictées ès Conférences du Bureau d'Adresse* (Paris, 1660), vol. 3, pp. 855-862 (Conférence 130 22 Novembre, 1638).

[12] *Ibid.*, pp. 860, 862

[13] *Ibid.*, p. 860

[14] *Ibid.*, p. 861.

In a sense, the debate at the *Bureau d'Adresse* anticipated later battles between the "ancients" and the "moderns." The opponent of the division of medicine attributes it to decadence on the part of modern physicians—a falling away from the pristine unity of the ancients. Physicians wanted to "avoid the trouble and retain the honor and profit" so they kept authority over medicine while relegating manual tasks to apothecaries and surgeons. This opened medical practice to persons of a lower sort, including barbers, wigmakers, and bath-house keepers. What is needed is a return to the practice of Hippocrates and Galen where the same person—a physician—managed all parts of the art.[15]

The spokesman for the tripartite division, on the other hand, is a "modern." The divisions reflect progress. The fact that ancient physicians combined the practice of medicine with surgery and pharmacy signifies only their meager knowledge; they, like contemporary village doctors could do everything because they knew so little of each part. The modern physician of the city excels both his country cousin and his ancient ancestor by virtue of superior knowledge.[16]

In summary, the opposing sides in the debate of 1638 both recognize three constituent parts of medicine, one of which is qualitatively superior to the other two. There is no disagreement on this principle of subordination. The only point of disagreement involves whether surgery and pharmacy should be subordinated to medicine within the same person or assigned to subordinate practitioners. In either case a unity results in which cognitive functions rule over purely manual ones. The physician in principle can do everything; in the one instance, he does; in the other he retains control over tasks which he is competent to perform but eschews for reasons of convenience, propriety, etc. Neither division of knowledge nor division of labor in the modern sense of specialization exist in this conception of the medical professions. Rather, one has a division between knowledge and labor. By way of support for this last point, it seems significant that the spokesman for dividing the medical professions does not refer to the manual or "mechanical" arts to illustrate his argument. For later proponents of medical specialization, the common and familiar practice of division of labor in the crafts would become a favorite analogy.[17]

---

[15] *Ibid.*, pp. 856-858. The point of view closely resembled that of Vesalius in his "Preface" to the *Fabrica* See C. D. O'Malley (trans), "The Preface of Andreas Vesalius (1542) in O'Malley, *Andreas Vesalius of Brussels, 1514-1564* (Berkeley: University of California Press, 1964), pp. 317-319.

[16] Renaudot, *Recueil général*, pp 860-861. The spokesman for the "moderns" in Charles Perrault, *Parallèle des anciens et des modernes, en ce qui regarde les arts et les sciences* (Paris, 1699), vol. 4, pp 257-258, made the same comparisons.

[17] See below, pp 531-534; Heckscher, *Rembrandt's Anatomy of Dr. Nicolaas Tulp*, pp 60, 143-144, notes

* * *

After about 1750, a new definition of the relationship between physicians and surgeons disrupted the old tripartite equilibrium. A change is evident in medical discourse, particularly that dealing with medical education. John Morgan's *A Discourse upon the Institution of Medical Schools in America* (1765) is a noteworthy exemplar of this literature.

In the *Discourse*, which he read at Philadelphia on May 30 and May 31, 1765, Morgan announced and eloquently justified the establishment of the first school of medicine in the American colonies. He also declared his intention to follow "the regular mode of practicing Physic."[18] By this phrase, Morgan meant that he would limit his practice to internal medicine or physic and not engage in either surgery or pharmacy. Having returned to his native Philadelphia with an Edinburgh medical degree after five years' study in Great Britain and on the Continent, Morgan clearly had European, and particularly Scottish, precedents in mind.[19] In the mid-eighteenth century, the Edinburgh College of Physicians prohibited its Fellows and licentiates to engage in pharmacy or surgery. Similar prohibitions appeared on the statute books of the London and Paris physicians.[20] In Philadelphia, as in other American cities, doctors combined the practice of medicine, surgery, and pharmacy.[21]

On the surface, Morgan's proposal seems little more than an attempt to introduce traditional European distinctions into colonial medical practice.

"the astonishing specialization of the crafts and trades in the sixteenth century," including medically related crafts. The Abbé de Saint Pierre's "Mémoire pour perfectionner la médecine," *Journal de Trévoux, ou Mémoires pour l'historie des sciences et des beaux-arts* (Paris, 1725), pp. 860-861, suggested that the model of craft specialization be applied to medicine. Such analogies may have attracted laymen reformers well before physicians.

[18] J. Morgan, *A Discourse Upon the Institution of Medical Schools in America* (Philadelphia, 1765, reprinted Baltimore: Johns Hopkins Press, 1937), xiii-xix, 40-45.

[19] In the prefatory "Apology for attempting to introduce the regular mode of practicing physic in Philadelphia," Morgan described his plan as "conformable to what is observed in Great Britian and all polished countries . . ." *Discourse*, xviii. On 15 July 1765, Morgan wrote to Sir Alexander Dick of Edinburgh: "I have commenced Physician on the regular plan observed in Great Britain . . ." Morgan–Dick correspondence, photocopies donated by Whitfield Bell to American Philosophical Society, Philadelphia (hereafter cited as APS). With regard to the new medical school itself, Morgan took Edinburgh as his model. See *Discourse*, pp. 28-30, 36.

[20] See *Historical Sketch and Laws of the Royal College of Physicians of Edinburgh* (Edinburgh, 1867), pp 65-67. Clarke, *Royal College of Physicians*, vol. 2, pp. 565-566. The new statutes of 1771 forbade licentiates to do midwifery or practice as apothecaries, but did not explicitly rule out surgery. A. Corlieu, *L'Ancienne Faculté de Médecine de Paris* (Paris, 1877), p. 263 (article 28 of statutes of 1751).

[21] Morgan, *Discourse*, p 39. See R. H. Shryock, *Medicine and Society in America: 1660-1860* (Ithaca, N.Y.: Great Seal Books, 1962), pp. 7-8.

Indeed this is the way in which recent historians have understood Morgan's "regular mode." It is usually added that the transplantation, if not totally misguided, was doomed to fail in an America which could neither support nor tolerate such distinctions.[22]

This interpretation came as a needed corrective to the rather ahistorical praise Morgan's *Discourse* customarily received. The founder of the university medical school in America, Morgan likewise was portrayed as a prophet of modern medical specialization. Those who saw Morgan as a precursor of specialization tended to project back upon their hero values of a later time while they neglected the historical circumstances of the mid-eighteenth century.[23] Such dragons no longer need slaying. Thanks to Whitfield Bell's biography of Morgan, we are as close as we are likely to get to the man as distinct from the mythical founding figure.[24]

The historical and present-minded interpretations of Morgan's "regular mode," however, do have something in common. Both focus on Morgan, the individual, and thus tend to assume that the *Discourse* expresses an idiosyncratic viewpoint. For one, it is an anomaly in terms of geographic space; i.e., what was "normal" for London or Paris becomes atypical for an American city. For the other, it is an anomaly in time, Morgan being "ahead of his time."

Here, another approach will be taken. It seems worthwhile to examine the *Discourse* of 1765 as a specimen of a general mentality—that of the elite European-trained physician of the second half of the eighteenth century, be he an American or native of Europe. For Morgan's speech was less one man's personal ideas than a normative statement of widely held views. Filled with citations from recent medical literature and carefully crafted for a formal ceremony, the *Discourse* did not severely tax its author's intellect.[25] If much of the content was familiar, the setting was new. The American setting presents the historian with an opportunity to study European ideas refracted through an environment in which the special interests of medical guilds were not directly involved.[26] Specifically, it may be fruitful to look at what the *Discourse* says about the medical professions, to compare its formulation with the traditional model, and to see whether ideas consonant with a new concept of specialization are present.

---

[22] For an extreme statement of this position, see D. J Boorstin, *The Americans The Colonial Experience* (New York: Random House, 1958), pp. 234-235, W. Bell, *John Morgan, Continental Doctor* (Philadelphia. University of Pennsylvania Press, 1965), pp 125-127, 129-131, reaches a similar, but more moderate, conclusion based on a thorough discussion of the *Discourse*; Shryock, *Medicine and Society in America*, pp 26-27, notes Morgan's emulation of traditional British socio-professional distinctions, but he also states that the proposal of separate practitioners "may be viewed as almost prophetic," and suggestive of medical specialization. *Ibid.*, pp. 8, 26.

[23] For examples of this interpretation, see A. Flexner, Introduction to 1937 Reprint of Morgan, *Discourse* p. v. B. Hindle, *The Pursuit of Science in Revolutionary America 1735-1789* (Chapel Hill, N.C.. University of North Carolina Press, 1956), pp. 115-116. R. K. Merton "Some Preliminaries to a Sociology of Medical Education" in *The Student-Physician*, ed. Merton *et al.* (Cambridge, Mass· Harvard University Press, 1957), pp. 8-26, presents a critical sociological analysis of Morgan's *Discourse* in which he identifies the element of specialization. But Merton tends to neglect the historical context of Morgan's proposal. The older literature on the history of American medicine typically gives high praise to Morgan's *Discourse*, in general, but does not deal specifically with the "regular mode," See F. R. Packard, *History of Medicine in the United States*, vol. 1 (New York: Hoeber, 1931), pp 347-354; W F Norwood, *Medical Education in the United States Before the Civil War* (Philadelphia. University of Pennsylvania Press, 1944), pp 2-8

[24] See above fn. 22. I am indebted to this work and to the same author's *The Colonial Physician and Other Essays* (New York: Science History Publications 1975) for numerous references to archival sources.

* * *

Before turning to the *Discourse* itself, several differences between specialization and older forms of separated medical practice must be made explicit. The following criteria constitute our working definition of the conditions for medical specialization. They may have a broader applicability to specialization within other scientific disciplines (this would need to be tested by further historical study of specific cases), but they do not fit other forms of division of labor, as, for example, that displayed in a factory assembly line.

First, and most important, specialization presumes some shared or common basis between the various specialties. This consists in theoretical knowledge represented by a set of scientific subjects, which, it is agreed, all practitioners need to learn before they go on to specialize. It is precisely this agreed-upon foundation which is lacking among so-called "specialists" or empirics of early centuries, a type at least as old as those Herodotus observed in ancient Egypt, and which bone-setters, cataract couchers, pox doctors, etc., represented in early modern Europe.[27]

Second, and in tension with the first point, specialization substitutes a division of technical knowledge[28] and of labor (practice in medicine) for an hierarchical ordering of knowledge and practice. Whether physicians and surgeons,[29] to take the case with which we are specifically concerned, form separate professions, or instead constitute subgroups within a single profession, as they do today, is not a primary issue as far as medical specialization is concerned. The crucial point is that each field have its own sphere of competence so that the respective practitioners regard one another as colleagues on a more or less equal footing. By contrast, the older type of professional division, as we have seen, subordinated surgeons to physicians.

---

[25] See "Dedication to Samuel Powell, Esquire," *Discourse*, iii, where Morgan refers to the composition of his speech as "an agreeable relaxation from severer studies," See also Shryock, *Medicine and Society*, p. 27

[26] Morgan, of course, was not personally disinterested For his ambitious plans to create London-style medical institutions in Philadelphia, see Shryock, *Medicine and Society*, pp. 27-28. However, unlike a European medical spokesman, Morgan did not formally belong to a special interest group.

[27] See Rosen, *The Specialization of Medicine*, pp. 1-2, 50-54. H. Sigerist, *A History of Medicine*, vol. 1 (New York: Oxford University Press, 1952), p. 319.

[28] This kind of technical knowledge or "know-how" is conveyed by the French term *savior*, whereas the theoretical knowledge in point #1 corresponds to *connaissance*.

Third, specialization opens the way for, indeed it implies, further divisions or the formation of sub-specialties. This was, for the most part, a nineteenth-century phenomenon.[30] It should be noted, however, that the ensuing differentiation of function, whether a direct result of scientific or technological innovation, or simply the gradual carving up of a larger domain, differs from earlier "specialization." In the latter, the various branches do not have a common foundation, and therefore have but a limited potential for growth and virtually none for differentiation.

Fourth, specialization carries a connotation of free choice. The decision to practice internal medicine rather than surgery depends largely upon personal aptitudes and predilections. Status becomes a secondary and less reliable means by which to distinguish physicians from surgeons. If anything, specialization confers higher status than general knowledge, a situation which is the inverse of the earlier relationship.

Finally, a negative point: specialization does not necessarily imply exclusive practice of a given field. Although a specialist, by definition, has particular expertise, he is not rigidly confined to this single area. Thus, a surgeon might also engage in the practice of internal medicine without surrendering his special competence in surgery. His general knowledge confers a potential versatility which is not possessed by the empirical specialist.

---

[29] Here I anticipate my later claim that physicians and surgeons form the original pair of "proto-specialists." See below, fn. 72.

[30] Instances of genuine surgical sub-specialization may be found by the mid-eighteenth century; i.e., certain surgeons who had scientific training and competence in all parts of surgery chose to limit their practice, or at least to emphasize, certain particular areas. An outstanding example was the French eye surgeon, Jacques Daviel (1696-1762). See S.-F. Morand, "Eloge de Daviel," *Opuscules de chirurgie*, vol. 1 (Paris, 1768), pp. 82-90. Denis Diderot, "Premiére lettre d'un Citoyen Zélé (1748) in *Correspondance*, ed. G. Roth, vol. 1 (Paris, 1955), pp. 68-69, noted: "Les Chirurgiens, instruits des principes communs de la Chirurgie, se sont distribués entre eux les opérations, et elles ne s'en font que mieux," Diderot suggested that physicians might also subdivide medical practice. Most lay commentators, however, did not draw a distinction between primitive and modern specialization. When they recommended a division of labor in surgery, they probably had in mind empirical surgical practitioners. See C. Perrault, *Parallèl*, p. 258: "Il y a des chirurgiens qui ne s'appliquent qu'aux maladies des yeux: d'autres qu'aux maladies des dents: les uns ne s'étudient qu'à tailler de la pierre, les autres qu'à accoucher des femmes, d'autres qu' à remettre les membres disloquez, et avec cela ils ont de la peine à bien sçavoir tous les préceptes, tous les secrets, et toutes les observations que contient la portion de Chirurgie qu'ils ont choisie pour leur partage."

* * *

John Morgan's *Discourse* clearly envisioned a common knowledge base for physicians and surgeons. After some introductory remarks, Morgan discusses at considerable length (13 pages out of a total of 63 in the entire *Discourse*) the subjects which both kinds of practitioners should study. It is the standard Boerhaavian curriculum, as taught at Edinburgh and other eighteenth-century medical centers. Anatomy, materia medica, botany, chemistry, and the medical institutions—i.e., physiology and pathology—are, says Morgan, "requisite in order to qualify them [the physician and surgeon] for successful practice." "A general knowledge, at least," he concludes, "in each one of them is useful to both Physician and Surgeon"; and then, as if catching himself, Morgan adds, "particularly to the former."[31] Throughout the *Discourse*, Morgan uses the phrases "medicine and surgery" or "physic and surgery" in parallel as in "the city of Philadelphia, adorned with a set of eminent practitioners, draws to it a great number of pupils . . . to learn the arts of Physic and Surgery."[32] Morgan also defines physic and surgery in parallel; each deals with different subsets of diseases, physic with internal ailments, surgery with external, though the surgeon also concerns himself with "those inward maladies which need the assistance of a dexterous operator to relieve them."[33]

Morgan was not alone in holding that the new Philadelphia medical school should and would teach internal medicine and surgery and produce physicians and surgeons. Others, including Thomas Penn, the proprietor of the colony, and Drs. Thomas Bond and William Shippen, Jr., both of whom did more than their share of surgical work, echoed Morgan's sentiments and affirmed that the school in fact dealt with all parts of medicine.[34]

John Fothergill, perhaps more than any other individual, shaped the attitudes and actions of American physicians who studied abroad after mid-century. The benevolent London Quaker physician conceived the project of a medical school for the capital of his favorite colony, a school which his young Philadelphia protégés, William Shippen and John Morgan, would initiate. Fothergill perceived surgical education as an important constituent of the new enterprise. In a letter of 7 April 1762 to James Pemberton of Philadelphia, the London physician first broached his "scheme." It would begin with the returning Shippen teaching a lecture course in anatomy, a subject which Fothergill affirmed to be "of exceeding great use to practitioners of Physick and Surgery."[35] Shippen did begin private teaching of anatomy and midwifery in November 1762; in 1765 he joined Morgan on the new faculty as professor of anatomy and surgery.[36] In summary, if Morgan and his contemporaries regarded surgery as inferior to physic, that attitude did not appear in references to medical education in the *Discourse,* nor in correspondence, nor in the actual formation of the school.

---

[31] Morgan, *Discourse*, pp. 5, 14.

[32] *Ibid.*, p. 30. "Let young men therefore, who would engage in the pursuit of medicine or surgery, make use of all their industry, to possess themselves in good time of these acquisitions [the liberal arts]," *ibid.*, p 18. See also, *ibid.*, pp 32, 33.

[33] *Ibid.*, p. 5.

[34] Letter from Thomas Penn to trustees of College of Philadelphia (15 Feb. 1765), reproduced in Packard, *History of Medicine in the United States*, vol 1, pp. 346-347, Thomas Bond to Benjamin Franklin (7 June, 1769), *The Papers of Benjamin Franklin*, ed. W B. Willcox, vol. 16 (New Haven Yale University Press, 1972), p. 154, Shippen to trustees of Coll. of Phila. (17 Sept. 1765), in Packard, *History of Medicine*, pp. 348-349.

Did Morgan then place medicine and surgery on a completely equal footing? The *Discourse*, and even more, the preliminary "apology for introducing the regular mode of practicing Physic" make it clear that he did not. For Morgan, internal medicine retained intellectual and, presumably, social superiority. He spoke of "painful and tedious operation [s] on the suffering patient" and the "irksome, but needful task" the surgeon performed.[37] One may say that this is simply a candid description of eighteenth-century surgery. But the language also reveals some disdain on Morgan's part, especially when he goes on to say that devotion to surgical operations is "inconsistent" with the more studious occupation of a physician.[38] In the "apology," which is obviously a more personal statement than the *Discourse*, the tone of superiority is stronger. Morgan likens the physician to a general of an army, who need not perform the tasks of a common soldier, and he points to the need for "proper subordination" between the medical professions.[39]

Such statements in the context of a proposal to introduce a "regular mode" of separated practice appear to exclude specialization as defined above and to reflect the traditional European hierarchical model. To some extent, surgery remains a manual craft, and thus inferior to physic, a learned profession. But, if the distinction persists, it is no longer sharp and unequivocal. To appreciate better the change in the physician's relationship with the surgeon, it is useful to compare the attitude toward the apothecary, who, it will be recalled, formerly held more or less the same low status as the surgeon.

---

[35] Historical Society of Pennsylvania [hereafter cited as HSP] Pemberton Papers, Etting Collection, vol 2, p. 47 Fothergill to Pemberton (7 April 1762) Reproduced in *Chain of Friendship, Selected Letters of Dr. John Fothergill of London, 1735-1780,* ed B C Corner and C. C. Booth (Cambridge, Mass: Harvard University Press, 1971), pp. 224-228.

[36] See Packard, *History of Medicine*, pp. 348-354.

[37] Morgan, *Discourse*, p 43.

[38] *Ibid* , p. 44.

[39] *Ibid.*, xvii: "The practice of physic requires deliberation, reasoning, judgement, and experience. Surgery calls for different powers and qualifications rarely uniting in one man." *Ibid.*, xvi.

In the *Discourse*, Morgan sharply distinguished the "business of pharmacy" on the one hand from the practice of internal medicine or surgery on the other. "Pharmacy," he states, "is entirely different from either [medicine or surgery]. Free from the cares of both, the Apothecary is to prepare and compound medicines as the Physician shall direct."[40] Here we come to the nub of the issue. Morgan intended to separate the practice of both surgery and pharmacy from that of internal medicine. But he had different reasons and justifications for each division. In the case of surgery, a relationship compatible with specialization is suggested, while in the case of pharmacy, Morgan advocates the older form of separation and subordination. The apothecary's mode of business, Morgan stated, made of physic a "vile trade" involving the sale of goods. Such conduct degraded the "noble profession" of medicine in which compensation ought to take the form of fees for attendance, advice, and services. For Morgan, the issue of fees clearly illustrated the difference between a liberal medical professional, be he physician or surgeon, and an apothecary-tradesman.[41]

Our interpretation of Morgan's proposal finds support in the response by his contemporaries. Those who reacted impassively or negatively thought drug-selling a tolerable and necessary part of the doctor's business. Dr. John Bard of New York, for example, wrote to his son, Samuel, in December 1765:

> Doctor[s] Prince, Tennent, and Smith keep their own medicines and Practice upon

---

[40] *Ibid.*, p 44

[41] *Ibid.*, iv-vi "The paying of a physician for attendance and the Apothecary for his Medicines apart is certainly the most eligible mode of practice, both to patient and practitioner." *Ibid.*, v An impressionistic survey of a few Philadelphia physicians' financial records from the 1750s and '60s suggests that at least some doctors already charged separately for visits, surgery, and drugs, and that they charged much less for the last than for "visits," "advice," "attendance" and major surgical work. This practice thus approximated Morgan's proposal as far as fees were concerned, though it did not involve separate practitioners. See HSP, Norris coll., vol. 2, p. 39; Logan coll., vol. 15, p. 43 (Thomas Bond); Stauffer coll , vol. 32, p. 2556; Cadwalder coll. (Phineas Bond) ccp, "Thomas Bond—Phineas Bond Copartnership Ledger, vol 3 (1758), *passim*. Thomas Bond, for example, charged £10 for "amputation, dressings, etc ," £1/14s for "advice in case of eye," 10s for a "visit," 10s for "cutting a seton in the neck," 2s/6p for "emetic," 2s/6p for "cathartic," *Ibid.*, pp 421-426. On the other hand, an older physician, John Kearsley (1684-1772), lumped together advice with remedies in his bills, and presented the patient with a single total. *HSP*, Gratz coll., Cadwalder coll

the old Establishment. But tho that mode is preserved a Gentleman will make his Practice Valluable in Proportion to his Merrit and address and Ease. Obliging and attentive manner with a proper degree of skill will Insure you the best practice and the highest fees notwithstanding you dispense your own medicines—it is the fashion, and unless Dr. Morgan can change the mode it will continue so. . . .[42]

Bard senior perceived the central issue of Morgan's proposed innovation to be the rejection of pharmacy. So did those who agreed with Morgan. Dr. Williams Smibert of Boston congratulated the Philadelphian for offering a "real" medical education to students instead of "a few months under the tuition of a retailler of drugs."[43] Samuel Bard shared his father's pragmatism and, at the same time, sympathized with Morgan's effort. In 1767, the younger Bard wrote to Morgan about his flourishing practice in New York City: "there is I own one disagreeable circumstance attending it, that of keeping a shop; but I have not quite as much courage as you, nor if I had, do I think such an innovation would be easily submitted to here as in Philadelphia."[44] Bard went on to declare in his own public discourse at King's College in 1769 that the "present mode of practicing medicine," whereby doctors dispensed as well as prescribed remedies, had become outdated, "injurious" to the inhabitants of New York City and "dishonorable to the profession." Yet he backed away from change.[45]

Physicians of the second half of the eighteenth century, to the best of my knowledge, made no such disparaging remarks about surgery.[46] Despite the fine distinctions Morgan drew and the superiority he doubtless felt, he and his colleagues recognized that surgery shared a partnership with physic, if for some it was only a junior partnership. Drs. Phineas Bond and Benjamin Rush "declined" the practice of surgery, and Dr. John Redman gave up surgical work in his later years. But Bond's more famous brother, Thomas, gained his reputation primarily as a surgeon; toward the end of his career, Rush advised his own son to study surgery in London. And Redman strongly urged his former apprentice, John Morgan, not to neglect his "genius" for surgery. Two New York city physicians, Samuel Clossy and John Jones, members of the original medical faculty at King's College, gave public speeches in the late 1760s in which they praised surgery as one of the most progressive parts of medicine.[47]

---

[42] The New York Academy of Medicine [hereafter cited as NYAM], Bard papers, MS letter, John Bard to Samuel Bard (11 December 1765).

[43] CCP, MS letter, Williams Smibert to John Morgan (Feb. 1769).

[44] CPP, MS letter, Samuel Bard to John Morgan (21 January 1767).

[45] S Bard, *A Discourse Upon the Duties of A Physician* (New York, 1769), Reprinted in *Two Discourses Dealing with Medical Education in Early New York* (New York: Columbia University Press, 1921), pp 12-13

[46] The statutes of European medical corporations prohibiting the practice of surgery and pharmacy by physicians come closest to being exceptions to this generalization See above fnt. 20. The Edinburgh regulations inspired a group of American medical students from Virginia to include in the founding articles of their "Virginia Club," established at Edinburgh in 1761, the provision that no member of the club should "degrade [the honor of his profession] by hereafter mingling the trade of an apothecary or surgeon with it " Cited in *The Bland Papers*, ed C. Campbell, vol 1 (Petersburg, Va., 1840), xvii-xviii.

Whatever status distinctions these doctors perceived between physic and surgery must have seemed minor indeed compared to the widening gap between either field and the business of pharmacy. John Fothergill summed up the situation when he expressed the hope that Shippen, Morgan, and other teachers of medicine in Philadelphia would "be exempted from the low drudgery of Physick and act as physicians only."[48] That the London physician included surgery under the rubric, "low drudgery," seems highly unlikely;[49] first, because the pejorative expression referred to some aspect of physic; i.e., internal medicine, and second, because Fothergill knew very well that Shippen intended to practice surgery. Fothergill probably encouraged Shippen's inclination toward surgery and midwifery as he later urged another talented young Philadelphian, James Hutchinson (1752-1793), to make "Surgery the object of my principal attention, and to endeavour to qualify myself well in that particular branch, so as to become a good operator, and if possible to render myself capable of giving a course of lectures on that subject in Philadelphia."[50] Not surgery, but the apothecary's trade was the object of Fothergill's condescending remark.

The pre-Revolutionary generation of progressive young American doctors thus found themselves in something of a dilemma with regard to pharmacy.

---

[47] B Rush "Memoirs of the life and character of John Redman," *Phila. Med. Museum* 1808, *5;* 51, E. H Thomson, "Thomas Bond, 1713-84, first professor of clinical medicine in the American colonies," *J Medical Education* 33 (1950). 614-624. *Letters of Benjamin Rush*, ed. L. H. Butterfield (Princeton: Princeton University Press, 1951), vol. 2, p. 1036 (7 February 1810); CPP, MS letter, Gilbert coll., III, p. 354, John Redman to John Morgan (13 March 1764), cited in Bell, *John Morgan*, pp 113-114. Samuel Clossy, "The Uses of Anatomy" (unpublished lecture, 2 Nov 1767) in M. H. Saffron, *Samuel Clossy, M. D., The Existing Works* (New York: Hafner, 1967), clx-cxv. W. B. McDaniel, "John Jones' Introductory Lecture to His Course in Surgery (1769), King's College, Printed from the Author's Manuscript," *Trans. and Stud. Coll. of Phys. of Philad.*, 1940, ser. 4, *8:* 180-190.

[48] HSP, MS letter, John Fothergill to James Pemberton (13 February 1765). Reproduced in *Chain of Friendship*, pp. 237-239.

[49] Bell, *John Morgan*, p 113 suggests the contrary However, this conclusion is, in part, based on an incorrect transcription of Fothergill's expression as "low drudgery of surgery."

[50] Cited in W. Bell, "James Hutchinson (1752-1793): Letters from an American Student in London," *Trans. and Stud. Coll. of Phys. of Phila.*, 1966, 4 Ser., *34:* 24; for Fothergill's influence on Shippen, see B. C. Corner, *William Shippen, Jr. Pioneer in American Medical Education* (Philadelphia: American Philosophical Society, 1951), p. 93. Shippen wrote from London to his uncle on 10 March 1759 of "the advantages . . . which are particularly great in my Way, in Surgery and Anatomy" HSP, Shippen Papers, vol. 4, p. 9. Reproduced in Corner, *William Shippen*, pp. 8-9.

Social aspirations argued for the exclusion of drug-selling. Obvious economic disadvantages, however, kept most doctors from breaking with traditional colonial practice. In addition, pharmacy was intimately associated with the medical apprenticeship and, hence, with the entire fabric of medical education in America. Most successful urban physicians, though they kept shops, entrusted their apprentices with the actual work of the apothecary—the mixing and grinding of herbs and chemicals used in the preparation of medicinals.[51] As John Bard remarked, "our apprentices are our apothecaries." Bard thought this fact "the only difference" between customary colonial medical practice and Morgan's proposal, which had called for professional apothecaries to replace the apprentices.[52]

The two main elements of Morgan's *Discourse*—the establishment of a medical school and the division of practice—had an underlying logical consistency. Both derived from the principle of division of function, which Morgan explicitly invoked, and both opposed education by apprenticeship, which assumed that a single master could teach the entire theory and practice of medicine.[53] But while the medical school was welcomed, the separation of the business of pharmacy from medicine threatened the American pattern of medical economics and training. Many who sympathized with Morgan's goal in 1765, like the nineteen-year-old apprentice, Benjamin Rush, remained skeptical of its chances for success. Even Fothergill urged Morgan not to be hasty in seeking to change time-honored colonial medical customs.[54]

---

[51] Morgan, *Discourse*, xvii-xviii: "But practitioners in great business never do, or can do the business of an apothecary in this place themselves They have apprentices for the purpose."

[52] *Ibid.*, xviii; NYAM, Bard Papers, MS letter, John Bard to Samuel Bard (11 Dec 1765). Here too, Morgan separates the practice of physic and surgery from pharmacy by noting that "the master . . . may be called from place to place to attend other cases of surgery or see other patients" while the apprentice-apothecary remains behind to prepare medications.

[53] See Merton, "Some Preliminaries to a Sociology of Medical Education," pp 11-13.

[54] Rush, *Letters*, p. 14 (21 May 1765), Fothergill to Morgan (7 Dec. 1765) in *Chain of Friendship*, pp 250-251. Morgan, *Discourse*, xiv, contrasted the general approval of "my plan for instituting medical schools" with the mixed reaction to his proposed mode of practice. See also APS, Morgan to A. Dick (15 July 1765) For a perceptive analysis of the tensions between traditional apprenticeship training and the professional aspirations of colonial physicians after mid-century, see D. C. Humphrey, "The King's College Medical School and the professionalization of medicine in pre-revolutionary New York," *Bull. Hist. Med* , 1975, *49*· 206-234. The traditional American medical apprenticehsip, which began at an early age and lasted as long as 7 years, derived from European guild (apothecary and surgical) precedents. This form of training came in for increasing criticism and modification by the medical profession in the late 18th and early 19th centuries Although the history of the American medical apprenticeship is poorly known, it is likely that for elite medical students who attended colleges, the apprenticeship gradually became a practical preceptorship analogous to the law student's post-college training The pre-Revolutionary American legal profession did not experience similar tensions over education by apprenticeship because the apprenticeship in law took place after a liberal arts education and it did not have to compete with law schools, which were not founded until the 1790s. See

But Morgan made good his plan. Within three years he built a flourishing practice in physic and referred patients to an apothecary, whom he had brought over with him from Great Britain.[55] Morgan was not the first to refrain from the "low drudgery of Physic"; others, like Dr. William Douglass of Boston, had done so earlier in the century. But they tended to be isolated instances.[56] Morgan, by contrast, drew widespread attention to the issue. Subsequently, Abraham Chovet and John Jones, both of whom had reputations as surgeons, also refused to keep shops, and others doubtless followed their examples. Charles Meigs, in a eulogy of Morgan written in 1827, noted that the period of the American Revolution marked a turning point in favor of Morgan's mode of practice in the city. "Now," Meigs added, "no Philadelphia practitioner keeps an assortment of medicines for his own use, if we are correctly informed."[57] According to Shryock, " . . . urban doctors gradually abandoned that practice [drugselling] during the decades between 1790 and 1820."[58] Outside the cities, of course, American doctors continued to keep apothecary shops. Nevertheless, the sparse evidence indicates that Morgan's call for the separation of pharmacy from medicine articulated an attainable goal for elite American practitioners, one which in fact was realized over the following half-century.

By the latter eighteenth century, the old concept of a tripartite medical profession in which the physician presided over the apothecary and surgeon had come apart. In colonial America, where the hierarchical model had never been more than an abstraction derived from European authors, medical men perceived the practice of pharmacy as a trade outside medicine, though, to be sure, still subordinate to it. Surgery, on the other hand, was regarded as one of the two branches of medicine, closely related to physic, and enjoying comparable if not identical status. The graduate of a medical school could opt to practice medicine and surgery in whatever proportions he wished though few, if any, could specialize exclusively in surgery. In 1805, Benjamin Rush commented that during the past four decades surgeons

---

J. M. Murrin, "The Legal Transformation: The Bench and Bar of Eighteenth-Century Massachusetts," in *Colonial America· Essays in Politics and Social Development*, ed. S. Katz (Boston, 1971), pp. 415-449.

[55] APS, Morgan to Dick (28 March 1768) referred to "my Practice as a Physician which is very extensive and constantly increasing." See also Bell, *John Morgan*, pp. 151-154; Morgan *Discourse*, iii, stated that he would have his prescriptions prepared by a Mr David Leighton who had been "educated in Great Britain in both pharmacy and surgery." See below, fn. 68, for a discussion of apothecary-surgeons

[56] C. Bridenbaugh, *Cities in the Wilderness*, 2d ed. (New York: Knopf, 1955), pp. 408-409. Boorstin, *The Americans: The Colonial Experience*, pp. 230-232

[57] C D Meigs, "Retrospective review," *N. Amer. Med & Surg. J.*, 1827, *4:* 382-383. Bell, *John Morgan*, p. 241, notes the irony that Morgan himself turned to keeping a shop in the 1780s.

[58] Shryock, *Medicine and Society*, p. 30.

had increasingly become specialists as well as medical professionals. As a result, surgery was "more confined than formerly to a few members of our profession," whereas before the American Revolution, "the practice of physic and surgery were united . . . in the same persons."[59] Morgan called the practice of surgery a matter of "inclination," as did Dr. Peter Middleton of New York and others.[60] Free choice, personal preference, aptitude, and experience became the relevant determinants in whether one called himself physician or surgeon.

The "regular mode" advocated by Morgan in the *Discourse* thus was not an anomaly in the history of eighteenth-century American medicine; it raised legitimate issues for doctors in colonial cities, many of whom, like Morgan had studied at Edinburgh, London, and on the Continent, and assimilated the values of the Enlightenment. Neither a prescient anticipation of modern specialization nor simply an echo of Old World guild distinctions, the division of medical practice appealed to contemporary scientific and social aspirations. European ideas shaped both.

* * *

Morgan's "regular mode" derived from a European context which no longer stood for a fixed tradition, but one in a state of flux. Among the most important novel elements was a change in the scientific and professional position of surgery.

Beginning in the latter seventeenth century, European surgery experienced continuous and cumulative progress. Advances stemmed in part from technical improvements. Although no spectacular innovations occurred, major surgery—amputations, operations for aneurysms, cutting for strangulated hernias, stones of the bladder, and cataracts, to name some of the most prominent procedures—became more reliable, safer, and thus more frequently performed. Control of hemorrhage during amputation, for example, became more effective as a result of the use of the "screw tourniquet" introduced by Jean-Louis Petit of Paris in 1718. Dutch, British, and French surgeons improved the lateral method of lithotomy by means of studies on the cadaver. Knowledge of optics, anatomy, physiology, and pathology converged in the development of techniques for eye surgery—construction of an artificial pupil, extraction of cataract, and the lachrymal fistula operation.[61]

---

[59] *Ibid.*, pp. 29, 59-60. Benjamin Rush, "An Inquiry into the Comparative State of Medicine, in Philadelphia Between the Years 1760 and 1766 and the year 1805," *Medical Inquiries and Observations*, 2d. ed , (Philadelphia, 1805), vol. 4, pp. 395, 375.

[60] Morgan *Discourse*, p. 43; P. Middleton, *A Medical Discourse or an Historical Inquiry into the Ancient and Present State of Medicine*, (New York, 1769), p. 61. James Hutchinson of Philadelphia wrote: "My own inclination and the advice of my friends, induced me to consider Surgery, as the Science in which I am to expect the greatest improvement, while in England . . " cited in Bell, "James Hutchinson," p. 23. See also above, fns. 47, 50.

Surgery benefited from revolutionary advances in seventeenth-century anatomy and physiology in ways which went beyond the direct application of new knowledge. For if physicians had a vested interest in maintaining traditional medical doctrines, surgeons did not.[62] Metaphors based upon notions of Galenic physiology, such as the comparision between the three physiological faculties and a tripartite hierarchy of medical professional functions, could not long survive the destruction of ancient physiology by Harvey and others. Progress in surgery provided ammunition for the moderns in their battle with the ancients;[63] surgeons, in turn, found the rise of mechanical philosophy congenial to their interests.[64]

Surgery's improved and improving state at the turn of the eighteenth century prepared the way for a rise in the social status of the surgeon, a process I have discussed elsewhere in the case of the Paris surgeons, who reaped the most tangible rewards in terms of royal governmental patronage.[65] The status of surgeons also rose impressively in Great Britain during the first half of the eighteenth century. The severing of institutional ties between barbers and surgeons took place at Glasgow in 1708, at Edinburgh in 1722, and at London in 1745, while the legal entity of the Paris barber-surgeon passed into extinction in 1743.[66]

The formal dissolution of united guilds of barbers and surgeons in major urban centers set a legal seal upon a process of separation which had been going on since the late seventeenth century. It represented official recognition of a surgical profession. Those who performed major surgical procedures in European cities of the early eighteenth century tended increasingly to be reputable men, possessing considerable knowledge of anatomy, rather than empirics. Unlike the relatively isolated figures of earlier centuries, leading surgeons achieved identity as a group, a group defined primarily in terms of function rather than position in a medical hierarchy. They took control of the surgical guilds at Paris, London, and elsewhere, served the royalty and high nobility of Europe, and forged a vitally important institutional connection with hospitals.[67] We may, indeed, designate them "hospital surgeons," for these institutions, military and civilian, increasingly provided the setting for the performance of major operations and the training of the most talented young surgeons.[68]

---

[61] Much of this section is based upon my doctoral thesis· T. Gelfand, "The Training of Surgeons in Eighteenth-Century Paris and its Influence on Medical Education," (Unpublished Ph.D. Dissertation, Johns Hopkins University, 1973), esp. pp 39-41, 106-113. See e.g., S. Sharp, *A Critical Enquiry into the Present State of Surgery* (London, 1750), *passim* for a contemporary review of progress in surgery.

[62] See O. Temkin, *Galenism, Rise and Decline of a Medical Philosophy* (Ithaca, N.Y : Cornell University Press, 1973), p. 136.

[63] C. Perault, *Parallèle*, pp 249-252.

[64] See, e.g., P. Dionis, *L'Anatomie de l'Homme*, 2d ed. (Paris, 1694), preface; J -F. Malgaigne, *Sur l'histoire et la philosophie de la chirurgie* (Paris, 1847)

[65] T. Gelfand, "From guild to profession: the surgeons of France in the 18th century," *Texas Reports on Biology and Medicine*, 1974, *32*· 121-134.

[66] Clark, *The Royal College of Physicians*, vol. 2, pp. 499-501, C. H. Creswell, *The Royal College of Surgeons of Edinburgh* (Edinburgh· Oliver & Boyd, 1926), p 130; J. D. Comrie, *History of Scottish Medicine to 1860*, vol. 1 (London: Bailliere, Tindall & Cox, 1927), pp. 94, 170; Gelfand, "From guild to profession," p. 125.

Although still below physicians, hospital surgeons did not merely rise in the medical hierarchy to stand above apothecaries; they sustained a more radical innovation, one which the Paris surgeons best articulated in the 1740s. Medicine and surgery, according to this view, shared a common basis in theory; the same principles and the same medical sciences applied to external and internal disorders. Practitioners of internal medicine and surgery, therefore, required the same scientific knowledge: "there must be no difference between them [the physician and surgeon] except that which is conferred by experience, acquired through practice in coping with the diseases each treats most frequently."[69] "Surgery," as defined by a surgeon in 1753 for the *Encyclopédie* of Diderot, became "external medicine," a field parallel with internal medicine and thus constituting one of the two major divisions of the healing art.[70] For physicians who normally took responsibility for matters of nomenclature, the definition was a disquieting novelty. They preferred to define surgery as a manual art and to classify it as one of three kinds of therapy; therapy in turn was a subdivision of practical medicine as opposed to theoretical medicine.[71] By demanding and effectively securing the same cognitive status as physicians together with recognition of their special knowledge and competence, surgeons disrupted the hierarchical model of the medical professions.

---

[67] Surgeons like Jean-Louis Petit (1674-1750) of Paris, William Cheselden (1688-1752) of London, and John Monro (? -1737) of Edinburgh epitomized dozens of colleagues in each of their respective cities. These men typically belonged to surgical guilds. Although their numbers were few, and fewer still could earn a living solely from the practice of major operations, they formed the nucleus of a new profession. See A. Louis, *Eloges lus dans les séances publiques de l'Académie Royale de Chirurgie de 1750 à 1792,* ed. E.-F Dubois (Paris, 1859), C. Wall, *The History of the Surgeons' Company, 1745-1800* (London: Hutchinson's 1937), *passim.*

[68] Gelfand, "The training of surgeons," pp 64-82, 193-246; Wall, *The History of the Surgeons' Company, passim.* For reasons, partly historical, and in part semantic, this new group of surgeons has been confused with the mass of low-level practitioners known also as "surgeons" (or "barber-surgeons" or "apothecary-surgeons," the former tending to be more common on the Continent, while the latter predominated in Great Britain). Both types of surgeons shared common guild origins and tended to overlap in performing minor surgical work, especially phlebotomies, and apothecary's functions The lower surgeons and apothecary-surgeons gradually evolved into the general medical practitioners of the 19th century, while the hospital surgeons consolidated their position as medical specialists. See Hamilton, "The medical professions" for developments in London. Creswell, *The Royal College of Surgeons of Edinburgh,* pp 36-37, 112-123, discusses the combination of surgery and apothecary's functions in the 17th-century Edinburgh guild Morgan, in fact, departed from the traditional Scottish model by advocating a separation between surgeons and apothecaries

[69] Quesnay, *Examen Impartial*, pp. 45-46 Quesnay presented this view under the rubric "C'est l'exercise de l'Art de guérir qui est partagé et non la Science " Such a notion of specialization allowed for secondary differences in terms of special technical knowledge for each type of practitioner.

After mid-century, internal medicine and surgery began to constitute two foci of concentration or specialization within European urban medical practice. At the same time the respective practitioners of each proto-specialty[72] drew closer together in terms of education and status. Even with regard to practice, the difference between physicians and surgeons tended to become more one of emphasis than of kind; few European surgeons could hope to make a living exclusively from surgery, and physicians, on their part, crossed over into surgical practice with increasing frequency. In Great Britain and in France, old professional distinctions became further obscured by the widespread custom of surgeons taking a medical degree and by the development of male midwifery as a field shared between physicians and surgeons.[73] The medical faculties, it is true, maintained statutory prohibitions against their physicians doing manual work. But these measures only betrayed an urgency on the part of tradition-bound institutions to defend increasingly threatened distinctions.

John Morgan's experience in Europe illustrates one American doctor's awareness of the elevated status of surgery. One may surmise the impact of a year's medical studies in London in the early 1760s when hospital surgeons, led by Percival Pott of St. Bartholomew's and surgeon-anatomists like the Hunters, enjoyed distinguished reputations. Morgan availed himself of the opportunities London offered in anatomy and surgery.[74] At Paris, where he spent the winter of 1763-64, living with and studying under the eminent hospital surgeon Jean-Joseph Sue, Morgan explicitly stated his impressions of surgery. The young American showed not the slightest trace of condescension when he implored the Paris Royal Academy of Surgery to admit him as a corresponding member. In letters to the Academy, Morgan lauded the "great progress" the surgical institution had brought to "so noble and useful a branch of literature."[75] Privately, he confirmed his high opinion of Paris surgery, noting its superiority to French medicine.[76] Morgan obtained the coveted title of correspondent from the Academy of Surgery, an honor which he owed as much to Sue's patronage as to his own anatomical skills.

---

[70] This position, which included the notion that surgery involved more than manual procedures, gained wide currency via Antonine Louis' article "Chirurgie" in Diderot's *Encyclopédie*, vol 3 (Paris, 1753), pp 350-352. See Gelfand "Empiricism and eighteenth-century French surgery," *Bull. Hist. Med.*, 1970, *44*. 49-51.

[71] See e.g [J B. Martinenq], *La Subordination des chirurgiens aux médecins démontrées par la nature des deux professions et par le bien public* (Paris, 1748).

[72] This term is used to distinguish internal medicine and surgery from subsequent "specialties" or, more properly, subspecialties of the 19th century, most of which constituted either subdivisions or mixtures of parts of medicine and surgery.

[73] See Gelfand, "The training of surgeons," pp. 369-383; Temkin, "The role of surgery in the rise of modern medical thought," pp. 248-251. W. Radcliffe, *Milestones in Midwifery* (Bristol: Wright, 1967), pp. 57-68.

In addition to the rise of surgery, changes in medical thought helped define new professional relationships. Eighteenth-century medicine, in general, adopted an empirical epistemology. In this respect the leading theoreticians or "system-builders" of the century—from Boerhaave to Sauvages to Cullen—differed from their predecessors. Such men reacted against the largely abortive campaign to deduce a rational system of medicine from principles of mathematics, physics, and chemistry. Instead, they followed an empirical method, self-consciously modelled upon natural history and displayed in elaborate descriptions and taxonomies of diseases.[77] Morgan assumed this view of scientific knowledge when he stated: "What indeed is all science, but the accumulated observations and discoveries of a succession of many people, framed into a system?"[78] Given this empirical epistemology, it is not surprising to find physicians gradually surrendering claims to omniscience in matters medical. The attitude that surgeons had legitimate observations and discoveries to contribute to the cumulative medical "system" became widespread.[79]

* * *

After mid-century, European-trained physicians tended to think of the parts of medicine, including their own province, in terms of specialized knowledge and technical competence. At times they even drew attention to the technical aspects of the art by likening medicine to ordinary crafts. Morgan referred to the "instructive lessons" medical practitioners might learn from the "mechanic arts." "Why," he asked rhetorically, "should the more difficult, but more ingenious and liberal arts, scorn to be taught wisdom from their example?"

---

[74] Bell, *John Morgan*, pp. 46-50, Morgan was in London from midsummer 1760 to midsummer 1761

[75] CPP, Carson scrapbook, p. 83 (22 May 1764). When informed of his acceptance as a corresponding member, Morgan wrote to the Academy of the "zéle que j'ai temoigné pour les progrés de l'art scientifique que vous professer [sic] avec tant de célébrité." *Ibid* , p. 97 (2 Oct. 1764).

[76] CPP, Morgan to Dick (20 Feb 1764)

[77] See M. Foucault, *Naissance de la clinique*, 2d ed. rev. (Paris: Presses Universitaires de France, 1972), pp. 1-19; T. M. Brown, "From mechanism to vitalism in eighteenth-century English physiology," *J. Hist Biology,* 1974, 7. 179-216

[78] Morgan, *Discourse*, p. 27.

[79] See e.g , J.-E. Gilibert, *L'Anarchie médicinale*, vol. 3 (Neufchatel, 1771), pp. 221-248

> It each of them [the crafts] a number of different artists are employed, who confining themselves every one to his own branch of business, the whole work is more quickly finished, and more highly improved. The length to which human skill may arrive, when thus properly directed is amazing. Why then should we continue to follow such a variety of different occupations as are generally crowded together in the practice of the healing art?"[80]

To illustrate the advantages of the division of labor, Morgan cited, among other examples, the case of the manufacture of a pin.[81] The humble craft of pinmaking, as described in Diderot's *Encyclopédie*, consisted of eighteen distinct operations performed by specialized artisans.[82] The *Encyclopédie* article, *épingle*, was published in 1755; as is well known, Adam Smith in his classic treatise, *The Wealth of Nations* (1776), took pinmaking as a paradigm for the vast increase in productivity made possible by the division of labor. Although one must distinguish the different subsequent histories of economic or technical division of labor from the specialization of knowledge within scientific disciplines, it is worth noting that Smith's and Morgan's conceptions were formulated at approximately the same time, and both derived from a common exemplar—existing craft practices.

Both authors may have drawn upon the *Encyclopédie* article. While this conclusion is probable for Smith,[83] Morgan appears to have consulted another French source, one slightly older than the *Encyclopédie* and of a specifically medical provenance. Morgan, it will be recalled, spent the winter of 1763-64 at Paris where he lived with the surgeon Sue, studied under him, and attended meetings of the Academy of Surgery. During this same period, he composed his *Discourse*.[84] Morgan borrowed extensively from the "Préface" to the first volume of *Mémoires* of the Paris Academy, a preface written by the surgeon François Quesnay and published in 1743. The American cited the "Préface" repeatedly; he copied five long passages, and, in two instances, reproduced the original French text.[85]

---

[80] Morgan, *Discourse*, xv, 40-41.

[81] *Ibid.*, xv, 40

[82] *Encyclopédie ou dictionnaire raisonné des sciences, des arts et des métiers*, vol 5 (Paris, 1755), pp. 804-807.

[83] A. Smith, *An inquiry into the Nature and Cause of the Wealth of Nations*, ed. E Cannan (New York. Modern Library, 1937), pp. 4-5, esp. editor's note, p. 5. Reference to pinmaking as a prime example of division of labor was also be found in E. Chambers, *Cyclopaedia· or an Universal Dictionary of Arts and Sciences*, vol. 2 (London, 1728), p. 814.

[84] Morgan, *Discourse*, "Dedication," iii.

In particular, Morgan found ideas in the "Préface" to support his case for the division of labor in medicine: the need for collective and cooperative scientific activity, the futility of any individual, no matter how great his genius, working in isolation, the need for the medical man to have leisure time, free from the cares of practice to devote to research, and the over-arching need for a preliminary liberal and scientific education.[86] Quesnay's "Préface" did not contain the analogy of the manufacture of a pin. But in 1744 a widely circulated and highly favorable review of the "Préface" quoted approvingly the passages on the cooperative and cumulative nature of scientific studies, and then added:

> One must always remember that a piece of iron or brass needs thirty different hands to become a pin, and that works of the mind require still more in the way of cooperative endeavor than purely material objects.[87]

The crucial point of congruence between this passage and Morgan's use of the same example is that both accept craft specialization as a valid model for "liberal" or intellectual activities. Neither, on the other hand, crudely conflates the two different levels of work. In a sense Adam Smith, too, employed the pinmaking illustration to make the same metaphorical point; for Smith's subject was not craft procedures *per se*, but rather the nascent liberal art of political economics. Here, specialization applied as a general economic principle.

The Baconian ideals which found their way into Morgan's *Discourse* were commonplaces of the Enlightenment, and the American might have turned to any number of sources. The fact that Morgan did turn to the Academy of

---

[85] *Ibid.*, pp. 21-23, 28, 39-40, 41-43, 46-47. For a discussion of Quesnay's "Preface," see Gelfand, "Empiricism and eighteenth-century French surgery," pp. 40-53.

[86] The *Discourse*'s argument for the division of medical practice (pp. 40-45) is introduced by a plea for the physician to have leisure time to devote to research. Only by limiting his practice can the medical man find time to devote to ". . . improving favorite studies . . . by which the science [of medicine] in general is greatly enriched" (*Discourse*, pp. 39-40). Morgan thus sees the division of medical practice as a prerequisite for theoretical progress. Again, in the midst of his defense of the "regular mode," Morgan returns to this theme: " . . . how great is the force of prejudice, that practitioners . . . should look upon those persons with disdain, who divide their application between study and practice, they inspire a contempt for theory, whereby they impose on the public who are no judges of its usefulness" (*Ibid.*, p. 42). In both passages cited, Morgan takes his text directly from Quesnay's "Préface" of the *Mémoires de l'Académie Royale de Chirurgie*, vol. 1 (Paris, 1743), pp. xviii-xix. Morgan's other statements on the empirical, collective, and progressing nature of medical knowledge (*Discourse*, pp. 21-23, 28, 46-47) also are supported "on the authority of the most celebrated academicians" (*ibid.*, p. 46); i.e., the "Préface" of the *Mémoires* of the surgical academy

[87] *Journal de Trévoux* (Jan. 1744), pp. 157-159.

Surgery is a more subtle and, perhaps, a more reliable indicator of the stature of surgery than his personal biases in the other direction. Ironically, Morgan, who personally believed in the superiority of medicine over surgery, adopted rhetoric which, in Quesnay's original context, had extolled surgery and supported parity between the two fields. Morgan's *Discourse* omitted the explicitly pro-surgical parts of the "Préface," but it could not avoid the implication of equality between medicine and surgery. This remained the basis for specialization in both formulations.[88]

* * *

Our analysis of Morgan's *Discourse Upon the Institution of Medical Schools in America* indicates that a concept of medical specialization, according to the analogy of division of labor, had currency in mid-eighteenth-century Europe. Definitely not the old hierarchical model fostered by physicians, the new specialization was in fact advocated first by surgeons who sought to change their professional status. The phenomenon of division of labor, long taken for granted in the crafts (from which surgery had only recently emerged), became conceptualized and generalized during the Enlightenment. Specialization embodied a number of contemporary values, not least of which were admiration for collective scientific activity and for craft techniques.[89] As a concept, specialization proved highly adaptable to diverse modes of discourse and institutionalization.

In this general context, John Morgan's *Discourse* appears neither prophetic nor even particularly original. Morgan did, however, voice ideas which were progressive for physicians of his time, not reactionary. He anticipated spokesman like Thomas Percival of Manchester, who in his classic treatise on medical ethics of 1803, divided the profession into physicians and surgeons while keeping apothecaries in a subordinate position.[90] In

[88] Quesnay's most explicit formulation of medical specialization occurs in his *Examen impartial* (Paris, 1748), pp. 46, 82-83. Remembered principally today as the founder of the Physiocrat School of economic thought, Quesnay (1694-1774) spent most of his career as a surgeon and physician. In the 1750s he turned his attention to political economic theory and contributed several important articles on that subject to the *Encyclopédie*. The relationship between Quesnay's medical and economic concepts deserves further investigation. I intend to discuss this subject in another article.

[89] Delaire, the author of the article *épingle* in the *Encyclopédie*, exemplified this combination of interests. He visited the pinmakers' workshops at the same time as he completed a scholarly analysis of Bacon's philosophy. Diderot commented that Delaire's example reflected the best spirit of Bacon: "passer sans dédain de la recherche des lois générales de la nature, à l'emploi de moins important de ses productions." *Encylopédie*, vol 5 (Paris, 1755), p. 807 In conceptualizing and generalizing the phenomenon of division of labor, the men of the Enlightenment, as they often did, followed Francis Bacon's lead. See, e.g., F. Bacon, *New Atlantis*, in *Works*, ed J. Spedding, vol. 3 (London, 1870), pp. 156-166

[90] T. Percival, *Medical Ethics or a Code of Institutes and Precepts, adapted to the Professional Conduct of*

nineteenth-century European cities, as in Philadelphia, where a College of Pharmacy was founded in 1821, pharmacists developed their own institutions outside of medicine proper. Physicians and surgeons continued the process of convergence begun in the previous century. At the same time, the recognition of internal medicine and surgery as areas of special competence became more pronounced.

Specialization and convergence of physicians and surgeons formed complementary parts of a single dynamic development. In America, the two fields matured within a common professional framework. In Great Britain, physicians and surgeons conserved old distinctions which gradually lost meaning. In France, educational and institutional unification occurred suddenly and dramatically during the Revolution. But in each case, specialization was implicit. Antoine Fourcroy's formulation before the Revolutionary convention in Paris in 1794 drew out the logical consequences of Morgan's *Discourse*:

> Medicine and surgery are two branches of the same science: to study them separately is to abandon theory to flights of imagination and practice to simple routine; both are left equally blind. To reunite them and fuse them together mutually enlightens and favors their progress. *Those students who prefer operating will devote themselves to this part of the healing art.*[91] (emphasis mine)

Medical specialization arose as a minor theme within a relatively homogeneous professional matrix. The convergence of European surgeons and physicians created a new conceptual framework which, in turn, permitted internal medicine and surgery to become areas for specialization. In Enlightenment America, Morgan's *Discourse* reflected and displayed to advantage the new ideas. In place of the medieval triangular model of the medical professions, the early modern situation resembled a circle with a single and still vague line of division. Soon other lines would appear. But not until the twentieth century did fragmentation into specialities begin to overshadow the common basis evolved in the eighteenth century.

Physicians and Surgeons (Manchester, 1803); reprint in *Percival's Medical Ethics*, ed. C. D. Leake (Baltimore: Williams & Wilkins, 1927), *passim*, esp. pp. 112-119.

[91] A. Fourcroy, "Rapport et projet de décret sur l'établissment d'une école centrale de santé à Paris, 27 Nov. 1794," in *Enquêtes et documents relatifs à l'enseignement supérieur*, vol 23, ed. A. de Beauchamp (Paris, 1888), p. 206.

"AS HEALTHY A PLACE AS ANY IN AMERICA": REVOLUTIONARY PORTSMOUTH, N.H.*

J. WORTH ESTES

Hall Jackson, one of four physicians in late eighteenth-century Portsmouth, New Hampshire, described that seaport town of about 5000 population as being "as healthy a place as any in America, or perhaps on the globe."[1] This possibly chauvinistic generalization led me to ask whether Jackson's evaluation was, in fact, correct, and if so, how did he know? In other words, what data were available in the Age of Enlightenment that would have permitted an eighteenth-century American surgeon to make such a statement?

To begin with, Jackson himself kept a journal,[2] recently discovered, over an unbroken period of twenty years. In it he listed all the births and deaths among his own practice. For many patients he tabulated their sex, race, age at death, and cause of death. Because he also listed the outdoor temperature three times daily for the entire period, as well as other features of the weather, it is likely that he designed his journal to test the then current hypothesis that health is affected by meteorological phenomena.

For instance, in 1799, Noah Webster, now remembered more as a doctor of words than of people, demonstrated to his own satisfaction that epidemics were the natural accompaniments of natural disasters such as comets, volcanic eruptions, and extremes of weather. Webster's dogmatism is revealed in his postulate: "The acquiescence of all descriptions of men, learned and unlearned, in the opinion that epidemic diseases are to be ascribed solely to infection or specific contagion, has proven extremely injurious to philosophy and medicine."[3]

Jackson's data pertaining to his own patients in the years 1774 through 1795 are entirely consistent with those in the Portsmouth bills of mortality

---

* Presented at the 50th anniversary meeting of the American Association for the History of Medicine, Philadelphia, 2 May 1975.

[1] Letter, Hall Jackson to Jeremy Belknap, 19 Dec 1789. In: Belknap Collection, Massachusetts Historical Society, Boston

[2] Hall Jackson, *Meteorological Register* . . MS. journal in 2 vols , dtd. Dec 1774 through June 1795 In: Collection of Mr. Joseph W. P. Frost, Eliot, Maine.

[3] Noah Webster, *A Brief History of Epidemic and Pestilential Diseases* . . . , 2 vols. (Hartford, Conn. Hudson & Goodwin, 1799)

BULLETIN OF THE HISTORY OF MEDICINE 50 536-552 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

compiled over fourteen of the twenty-three years following his death in 1797. These unusually detailed data were collected by two physicians of the town, Lyman Spalding,[4] later a principal author of the first (1820) *United States Pharmacopeia,* and Richard Thurston.[5] Their medical tabulations, when taken in conjunction with concurrent U. S. Census data, [6] permit the computation of several health statistics for Hall Jackson's Portsmouth. These statistics, in turn, can then be compared with similar kinds of data for other communities in the United States and Europe in order to assess Jackson's opinion of the health of Portsmouth.

Bills of mortality were not then generally used simply as medical indices of public health. Often they were collated for political and philosophical purposes. About a century before Hall Jackson began his surgical practice, John Graunt and others in London had begun to realize the scientific as well as the social and political uses of mortality data.[7] And in the year after Jackson's death, Thomas Robert Malthus published his pioneering *Essay on the Principles of Population, as It Affects the Further Improvement of Society.*[8] In his study, one of Malthus' aims was to explore the social implications of differences among the healths of populations and their habitats. Twentieth-century hypotheses relating health to social characteristics of populations are hardly new. The eighteenth-century concept of that relationship was not founded on the premise of medical *progress*—that concept had not yet evolved. Malthus and his predecessors studied the relationship between health and society in order to exploit its predictive value. It may not have been, then, only the necessity of apportioning representation in the House of Representatives that led the drafters of the U. S. Constitution to require a decennial Census; the collection of such data would have been of general interest and applicability to the developing social and economic needs of the young nation.

Hall Jackson was well known as both physician and patriot. Born in 1739, he studied medicine at home with his father and his uncle. Like most American physicians of the time, he had no university training, although he did spend the year 1762 in London hospitals. Upon his return he opened an office and apothecary shop. During the Revolution, Jackson was distinguised almost as much for his military as for his surgical skills. An artillery expert, he helped design the defenses of Portsmouth Harbor. When not practicing medicine or marksmanship he drilled the local militiamen as their elected captain. He went to Cambridge to help treat the militamen wounded at Lexington and Bunker Hill. However, he was bitterly disillusioned at losing the job of Director-General of the Medical Department of the newly formed Continental Army to Benjamin Church, who was found guilty of treason soon afterwards. By late 1775, Jackson had returned to Portsmouth, where he spent most of the rest of the war caring for troops stationed there.

---

[4] Lyman Spalding, *Bills of Mortality for Portsmouth, New Hampshire.* Eleven broadsheets, 1801-1811.

[5] Richard Thurston, *Bills of Mortality for Portsmouth, New Hampshire.* Three broadsheets, 1818-1820

[6] *Population Schedules of the Second Census of the United States 1800* Microcopy No. 2, Roll 20, New Hampshire (Washington, D. C.: The National Archives, 1960); *Census of the United States for 1810* (Washington, D C., 1813), *Census of the United States for 1820,* Book I (Washington, D. C.· Gales & Seaton, 1821); U. S Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957* (Washington, D. C : U. S. Government Printing Office, 1960)

[7] *A Collection of the Yearly Bills of Mortality for 1657 to 1758 . .* (London A. Millar, 1759), National Library of Medicine Microfilm Reel 72-73, item 10 The *Collection* contains several contemporary commentaries on the uses, and potential uses, of the data in the bills of mortality.

[8] Thomas R. Malthus. *Population. The First Essay* [1798] (Ann Arbor. University of Michigan Press, 1971).

Newspapers reported Jackson's operations for cataract and his amputations of gangrenous limbs, much as heart transplants were reported in recent years. He was famous throughout New England for his services at a number of smallpox inoculation hospitals, and for his skill in obstetrics. Although Jackson was convinced he would die of his gout, it was a carriage accident that killed him at the age of 58. He was an inquisitive, efficient, and knowledgeable physician, in a time and place that required high standards of medical practice. Today he is remembered best for having introduced digitalis to America, for the treatment of dropsy.[9]

The Spalding-Thurston bills of mortality for Portsmouth are representative both of Hall Jackson's professional experience, and of the entire Revolutionary American medical experience. Although Jackson's own non-obstetric data are concerned only with the deaths that occurred among his patients, he would have been called upon to treat much the same spectrum of non-fatal disease as did Spalding and others in the next generation of Portsmouth physicians. No major improvements in methods of cure or prevention of disease occurred between Jackson's death and the last of the Portsmouth Bills. Jackson himself was responsible for introducing to America the one demonstrably effective new drug treatment of the era, digitalis, but the prevalence of dropsy was insufficiently great for the new drug to have altered significantly the life expectancy of any entire community.[10] Jenner's new vaccination technique for smallpox prevention came to Portsmouth four years after Jackson's death, but the Spalding-Thurston data show that the efforts of Jackson and his colleagues to eradicate the disease with the older inoculation technique had helped to reduce to a practical minimum the mortality rate associated with the dread disease, even in the face of an epidemic.

---

[9] J. Worth Estes, "An account of the foxglove in America," *Bull. Hist Med.*, 1973, *47*. 394-408.

[10] *Ibid.*

Although several problems can be associated with eighteenth-century vital statistics, I will beg the question of the diagnostic validity of the raw data. It is not likely that "better" data, even if available, would alter substantially the answers to our questions. In addition, we must also view the health of young America through eighteenth-century eyes, rather than with hindsight, to arrive at our answers. Jackson, of course, could have based his estimate of the town's health only on those data that were available to him in his own day. We can, however, use some of the same data in ways not then available, and corroborate them with contemporaneous non-quantitative, descriptive observations.

For instance, others held opinions like Jackson's. When Timothy Dwight, president of Yale College, travelled north from New Haven in 1795-96, he observed that "New England is the healthiest country in the United States, and probably inferior in this respect to few in the world." He supported this generalization in his patently chauvinistic account of his travels, with data showing that a newborn infant had a 50% chance of living to age 5 in Europe, while he had the same chance of living to age 17 in New England.[11]

Dwight reckoned that Portsmouth boasted 31 streets, 38 lanes, 10 alleys, and 3 public squares. He found the town's appearance unpleasant and disagreeable, although he did admit that he enjoyed its inhabitants' company. Other travellers, too, found Portsmouth's houses rather dilapidated.[12] Chiefly a commercial and manufacturing town, its 75 cod fishing and whaling vessels contributed less to its economy, when compared to the economy of the rest of the state, than the Portsmouth area's relative inability to support major agricultural efforts might have suggested. Investigators since the seventeenth century have shown that economic advancement, with its predictable proportional rise in the standard of living, is the most important factor associated with declining mortality rates. The standard of living in the Portsmouth of Hall Jackson and Lyman Spalding appears to have been less than in other American towns of the time.

The population of Portsmouth at the three U. S. Censuses taken over the years during which Spalding and Thurston compiled the bills of mortality is

---

[11] Timothy Dwight, *Travels in New England and New York* 1821-1822 , vol. 1 (Cambridge: The Belknap Press of Harvard University Press, 1969), p. 58.

[12] Marquis de Chastellux, *Travels in North-America in the Years 1780-81-82* (New York, 1828). J. P. Brissot de Warville, *New Travels in the United States of America, 1788* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1964).

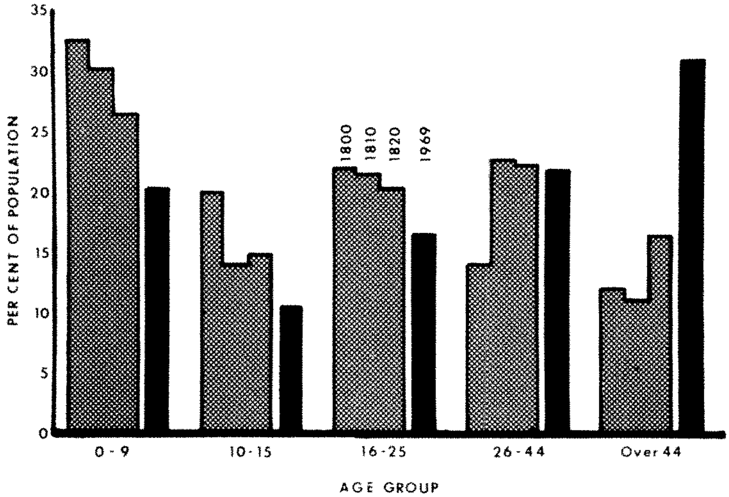

Fig. 1. The population of Portsmouth, N. H., 1801-1820, and in 1969, characterized by age. Compiled from data in references cited in notes 4, 5, 6, and 13.

characterized by age groups in Figure 1. There were about 20% fewer men than women in the oldest age group. We will see later, however, that life expectancy was greater for men than women in Portsmouth, but not in other cities for which data are available. The increase in the proportion of people aged 26 to 44 by 1810 suggests that new families were moving to Portsmouth during that time, with the growth of the town's maritime industry. The relative deficits of men of the same age ten years earlier suggests that the number of men in the town had decreased during the Revolution.[13] Other evidence which helps confirm this conclusion is the observation of a French traveller who, in 1788, found women and children in rags in Portsmouth, the only town in the country in which he observed this apparent effect of the war.[14]

Three kinds of mean annual death rates for the population of Portsmouth from 1801 through 1820 can be calculated from the data used to construct Figure 1. The crude death rate per 1000 population was 18.1; there were 14.4 fetal deaths per 1000 live births; and 47.6 deaths per 100 births. Because none of these rates consistently increased or decreased over the twenty year period, as assessed by regression analysis, it is probable that there was little, if any, measurable change in the overall health of the people of Portsmouth during the 30 to 40 preceding years, when Hall Jackson was in practice. Later we will see that about one half of all deaths were due to infectious diseases, a group of diseases that could be treated no better in the twenty years after Jackson's death than in the twenty years before. As was noted later by the greater pioneer vital statistician Lemuel Shattuck of Boston, the prevalence of infectious disease is "the great index to the health of a people."[15]

---

[13] U. S. Bureau of the Census, *Statistical Abstract of the United States 1970*. (Washington, D. C., 1970).

[14] Brissot de Warville, *op. cit.* (n. 12 above), p. 366

Only the birth rate changed consistently during the twenty years over which Spalding and Thurston reported the medical facts of life in Portsmouth; it gradually decreased from 48 to 25 births per 1000 population. This is about the same rate at which the birth rate of the entire United States decreased at the same time, although Portsmouth's birth rates have always been somewhat less than those of the rest of the country. Even that lower birth rate is about twice the current New Hampshire birth rate. This continuing downward trend is a common biological adjustment for maintaining a growing population until it reaches its spatial or geographical limits. The average marriage rate in Portsmouth 150 years ago was 10 per 1000 population, which is about 75% of the current New Hampshire marriage rate. However, it is also about 25% greater than contemporaneous marriage rates in France and Massachusetts.[16]

The fetal death rate per 1000 births was the same then as it is now.[17] which might be expected if adverse effects on the unborn fetus occurred no more frequently then than now. On the other hand, the newborn death rate was extraordinarily high 150 years ago, because of the prevalence of diseases which we can now recognize as being infectious.

The overall death rate for Portsmouth has declined from 18.1 per 1000 in 1820 to 10.2 today, and the ratio of deaths to births has increased from 48 per 100 to 62 per 100.[18] These changes are consistent with both the present lower birth rate (18.7 per 1000) and the relatively larger population of childbearing age in the early nineteenth century. The lower ratio of deaths to births 150 years ago would be expected in a rapidly growing new country in which the average family size was 5.8; in Portsmouth it was 6.1. In 1957 the average American family comprised 3.4 persons.[19]

---

[15] Lemuel Shattuck, *The Vital Statistics of Boston* [1841]. Reprinted in: *Boston Registry Department, Bills of Mortality, 1810-1849, City of Boston* (Boston: The Registry Department, 1893)

[16] William Currie, *A View of the Diseases Most Prevalent in the United States of America, at Different Seasons of the Year* (Philadelphia: J. & A. Y Humphreys, 1811).

[17] *Statistical Abstract 1970* (n 13 above).

[18] *Ibid.*

[19] *Historical Statistics* (n. 6 above)

Hall Jackson's own data[20] are consistent with other evidence pertaining to the health of Revolutionary Portsmouth, and they appear to provide a valid sampling of the health statistics of the town. His journal gives us a rare first hand glimpse at the vital statistics of the practice of an eighteenth-century physician, although we still lack statistically analyzable data about his non-obstetrical and non-fatal cases, as we do for most physicans of his day.

The average yearly numbers of births and deaths that Jackson recorded are about a fourth of those expected for the entire town of Portsmouth, as would be expected, because, Jackson was one of four doctors in the town.[21] Even if the 519 births and 247 deaths he listed are not a complete tally, any omissions probably are negligible.

Jackson attended 511 pregnancies during the twenty years for which he kept records. Thus he averaged about 25 deliveries a year, not a staggering caseload by present standards. Of all the pregnancies, about 2% resulted in stillbirths. Of the 507 live babies that Jackson delivered, 51% were white males, 43% were white females. and about 1% each were black males and females. The remainder were twin births (all white), which occurred in 1.6% of the 499 pregnancies that resulted in live births. This incidence of twin births is about 25% greater than the 1.28% incidence in similar populations in the twentieth century.[22] Although the difference may not be statistically significant, if Jackson did enjoy a special reputation as an obstetrician he would have been sought out for possibly difficult or unusual cases, such as twin births.

He noted that one of the babies he delivered had an easily observable congenital malformation, a girl with an imperforate anus. Although as many as 6 or 7 gross anomalies would have been predicted among the 507 live births,[23] this apparent underestimate is most likely the result of a less extensive perception of birth defects in the eighteenth century.

Jackson delivered the fewest (eleven) babies in 1776, perhaps reflecting the general social malaise that prevailed at the outbreak of the Revolution during the preceding year. He delivered the most (thirty-nine) in 1786, after the peace with Britain had been well established, and during the height of speculation[24] that Portsmouth might someday become a leading maritime center.

The average annual number of deaths among Jackson's patients is about 12. Thus the ratio of births to deaths among his patients is two, approximately the same as that for the whole town of Portsmouth over the subsequent two decades, further evidence that Jackson's tabulation is a random sampling of certain measures of the overall health of Portsmouth.

---

[20] Jackson, *Meteorological Register* (n 2 above).

[21] Estes, *op cit*. (n. 9 above).

[22] J Worth Estes, "Genetic counselling," *Med Times*, 1970, no. 4, 98: 92-106.

[23] *Ibid.*

[24] Chastelux, *op. cit*. (n. 12 above), p. 313.

It is not entirely clear why the greatest annual number, thirty, of his patients died in the year 1776. From the diagnoses given, the majority of deaths resulted from pneumonia and other infectious diseases. They may have been connected largely with the outbreak of the Revolution; other New England towns experienced serious epidemics during the first year or so of the War, and the large number of deaths in Portsmouth during that year coincided with the record low number of births.

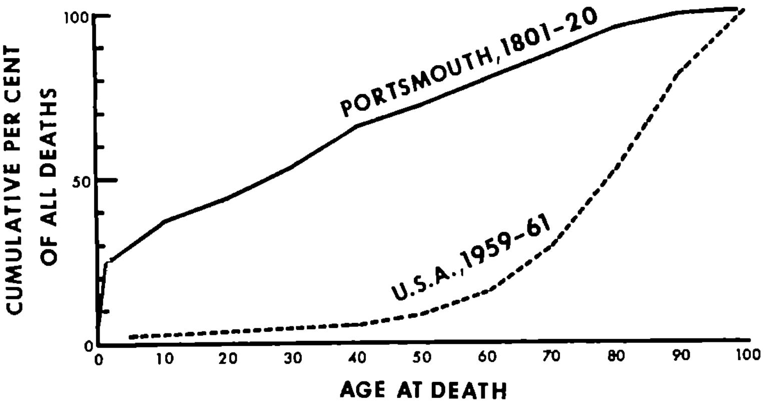

Fig. 2. The cumulative probabilities of dying by any specified age in turn-of-the-eighteenth-century Portsmouth, N. H., and in twentieth-century America. Compiled from data in references cited in notes 4, 5, and 13.

Figure 2 shows the cumulative probability of death by successive ages in Portsmouth in the period 1801-1820 (and among Hall Jackson's patients from 1774 to 1795) and in mid-twentieth-century America. One half of Jackson's patients, for instance, died by age 26, whereas one half of present-day Americans die after age 80. The median age of the entire U. S. population 150 years ago was 16 years; today it is 28.[25] The first ten years of life carried a disproportionate risk of death, compared to that of the subsequent years. They still carry a serious risk, although it is smaller now than then. However, if a person survived those first, most dangerous years, the next fifteen years were associated with very little risk.

[25] *Historical Statistics* (n. 6 above); *Statistical Abstract 1970* (n. 13 above).

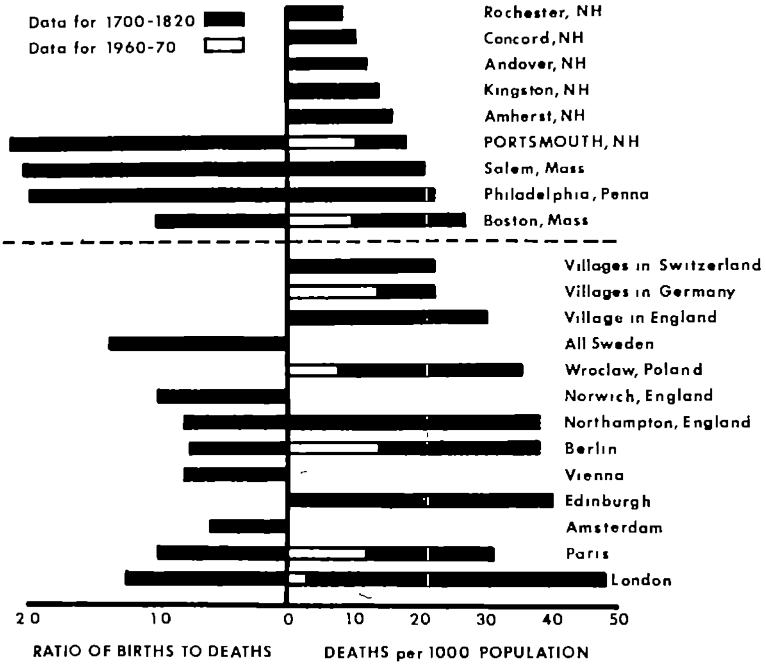

Fig. 3. Death rates, and the ratios of births to deaths, for twenty-two eighteenth-century American and European communities, arranged in order of increasing population density from top to bottom for both continents. Compiled and calculated from data in references cited in notes 4, 5, 12, 13, 15, 26, and 27.

The data in Figure 3 confirm the opinion shared by Jackson, Dwight, and others that New England was about as healthy as other American or European communities.[26] Some of the same data were, in fact, widely published at the time, although we cannot be certain that Jackson had seen any of them.[27]

At the turn of the eighteenth century, Portsmouth, the largest town in New Hampshire, had a death rate up to twice that of other smaller towns in the state. Salem, across the border in Massachusetts, was comparable in size, population, economics, and death rate to Portsmouth. Boston and Philadelphia were the metropolises of early America.

---

[26] Jeremy Belknap, *The History of New Hampshire* . . . , ed. 2, vol. II (Boston: Bradford and Read, 1813); J. Farmer and J. B. Moore, *Collections, Topographical, Historical and Biographical, Relating Principally to New Hampshire*, vol. 1 (Concord, N. H.. Hill & Moore, 1822); William Barton, "Observations of the probabilities of the duration of human life, and the progress of population, in the United States of America," [1791] *Trans. Am. Philosoph. Soc* , 1793, *3*: 25-62; "Bill of mortality for Rochester, N H ," *Collections of the New Hampshire Historical Society*, 1824, *1*. 283-284.

[27] O Pearson, "Mortality in Kingston, N. H. from 1725 to 1832," *Collections of the New Hampshire Historical Society*, 1837, *5*: 250-252, D Adams, ed , *Medical and Agricultural Register*, 1808, *1*: *passim*; Statistical Office of the United Nations, *Statistical Yearbook 1964* (New York: United Nations Publishing

Contemporaneous English and Scottish death rates were, in turn, up to twice those of Portsmouth. The lowest documented death rate in England was for a small country parish near Shrewsbury. Death rates in rural areas in Germany and Switzerland were more like those for Portsmouth. It is surprising that the death rate in Paris was as low as it is reported to have been; eighteenth-century Paris could not have had an unusually healthy milieu. It is possible, and even probable, that vital statistics for that city were not as complete as those for England and her colonies.

All these data support the hypothesis that overall death rates in densely populated urban areas are likely to be greater than in rural areas. This principle had been established even before Malthus applied it to the study of social problems. During the eighteenth century it had become grounded in scientific observation for the first time, but it was also incorporated into the growing new attitude called Romanticism. That is, the relative healthiness of rural areas could now be proved statistically. These data provided, then, some rationale for the Romantic's delight in the rural life, one of the attractions offered by the vast uninhabited American continent which was being opened to immigration from the whole world.

Ratios of births to deaths also help us understand population dynamics. When births outnumber deaths by two to one, as at Portsmouth, Salem, and Philadelphia, it can be inferred not only that the population is being replenished rapidly, but also that a substantial proportion of the population consists of people in the biologically vigorous and economically productive years that usually coincide with the reproductive years. As the ratio approaches one, as at Boston, Norwich, and Paris, it appears that something like zero population growth has been achieved, at least when immigration cannot be taken specifically into account. Boston's growth rate, unlike those of other important American cities, may have become balanced because the town's growth potential was limited by its location on what was then virtually an island. As the ratio of births to deaths further decreases below one, as was true in eighteenth-century Amsterdam, the resulting picture might be thought of as one of at least stagnation if not decline. However, as Malthus

---

Service, 1965). J. McKean, "Synopsis of several bills of mortality," *Mem Amer Acad. Arts & Sci.*, 1804, *2*: Part II, 62-70; E A. Wigglesworth, "A table shewing the probability of the duration, the decrement, and the expectation of life, in the states of Massachusetts and New Hampshire . .," *ibid*, 1793, *2* Part I, 131-135; *United States Life Tables by Causes of Death 1959-61*, U.S. Public Health Service Publication no. 1252, vol 1, no. 6 (Washington, D.C., 1968).

pointed out, a high birth rate might be favorable to developing nations like America, but it might be equally unfavorable to older, established nations.[28]

It is difficult to study the causes of death listed in Hall Jackson's journal or in the Spalding-Thurston bills of mortality in terms of modern concepts of pathology and etiology, most of which were largely unknown in the days before the discovery of bacteria, or the development of even the concept of heart disease. Nevertheless, a number of deductions about the health of colonial and federalist Portsmouth can be made from available data.

Infectious diseases, especially consumption, or tuberculosis, were the leading causes of death in Portsmouth, and in other cities for which data are available. Timothy Dwight outlined current thinking on the causes of consumption, which accounted for about 25% of all deaths in Portsmouth: "The natural causes are the severity and especially the frequent changes of the weather. The artifical ones are intemperance, prevailing to a considerable extent among people of the lowest class, and unhappily not altogether confined to them; a sedentary life continued to such an extent and so much unaccompanied by exercise as to leave the constitution too feeble to resist the attacks of cold . . . . A young lady dressed *à la Grecque* in a New England winter violates alike good sense, correct taste, sound morals, and the duty of self-preservation."[29] Later we will examine data that tend to confirm Dwight's opinion on the influence of the sedentary life on consumption.

Cholera was Portsmouth's second most frequent killer, while typhus and typhoid fevers, which were not then distinguishable, followed in frequency. The several cities of America and Europe for which causes of death at that time were tabulated show only moderate variations in the rates of death attributed to each infectious disease. These variations arise from differing endemic and epidemic conditions among the cities, rates which are not measurable so long as annual morbidity data are not available, as they are not for any of those cities.

The problems of differentiating among the non-infectious diseases, and of differentiating them from infectious diseases, often are insurmountable. Most of the many deaths ascribed to convulsions, for instance, must have been among children with infectious diseases. In any case, eighteenth-century medicine did not understand central nervous system disease in the same ways we do now. Conversely, the astonishingly low incidence of cancer as a cause of death in the Portsmouth bills of mortality undoubtedly is

[28] Malthus, *op cit.* (n. 8 above), pp 44-48.

[29] Dwight, *op. cit.* (n. 11 above), p. 59.

an underestimate. Most cancer deaths are obscured for us by diagnoses such as atrophy, bedridden, old age, and jaundice, diagnoses which reflect only an imperfect understanding of pathology.

Death has been attributed to dropsy, or, in the twentieth century, to congestive heart failure in about 3 to 5% of the population, including that of Portsmouth, for the last 400 years.[30] This frequency has remained consistent even since the introduction of new diagnostic aids such as the stethoscope and the electrocardiograph. Many of the cardiovascular diagnoses listed by Spalding and Thurston could have been made only by autopsy; diagnoses such as ossification of the aortic valves and patent foramen ovale could have been made only after careful dissections. Jackson himself wrote a detailed report of his post mortem examination of the heart of a United States senator who had an unusual congenital heart disease. In it he demonstrated an amazingly knowledgeable interpretation of the clinical implications of his findings.[31]

Comparison of the 1801-20 Portsmouth data with twentieth-century data shows some interesting similarities that corroborate both the skills of the earlier physicians and the relatively unchanging prevalence of some causes of death. The marked decline in mortality from infectious diseases in the past 150 years (from 959/100,00 in 1801-20 to 46/100,000 in 1959-61) is, of course, the single greatest triumph of modern medicine.[32] On the other hand, the apparent five-fold increase in the death rate from cardiovascular disease (from 109 to 588 per 100,000 population), and the twenty-fold increase in deaths from cancer (from 11 to 193 per 100,000), are to some degree only factitious, reflecting largely our own improved knowledge of these disease processes.

The prevalence of primary renal disease as a cause of death seems not to have changed much in 150 years (from 10 to 5 per 100,000), nor has the incidence of congenital malformations (consistent at 9 per 100,000), although Jackson did not observe as many as did his colleagues. In fact, congenital anomalies would be expected to occur with consistent frequency in the absence of massive changes in the quality of the gene pool of the population. Accidental deaths, too, seem not to have changed in frequency (53 per

---

[30] Estes, *op cit.* (n. 9 above), table 2

[31] Letter, Hall Jackson to William Plumer, 20 Feb 1786. In: Vol. 1 of the Plumer Letters, New Hampshire State Library, Concord. This letter has been published in: J Worth Estes, "An eighteenth-century clinicopathologic correlation." *Bull. N. Y Acad. Med*, 1976, *52:* 617-626.

[32] Cause-specific mortality rates per 100,000 population were computed from data given in references cited in notes 4 and 5 above for 1801-20, and, for 1959-61, they were abstracted from National Center for Health Statistics, *United States Life Tables* (see n. 27 above).

100,000). Drug poisonings still occur at the same rate (less than 4 per 100,000), if one subtracts from the modern data the figures which include the current predisposition to use drugs for non-medical purposes. Surprisingly, even suicide continues to occur at the same rate (11 per 100,000); it may be, perhaps, an irreducible minimum.

Life expectancy data provide yet another index of the health of populations. Techniques for computing life expectancy were available even in the eighteenth century, to permit making comparisons among populations in respect of their relative healthiness, as well as for life insurance purposes.[33] The technique used today yields essentially identical results.

Some representative eighteenth-century life expectancy curves are shown in Figure 4. In addition to computing the curves themselves, I also calculated the areas under the curves for each of 21 communities, ranging in size from small country towns to the metropolises of London and Paris, to provide a convenient summary assessment of the health of Hall Jackson's Portsmouth relative to that of other places in his day. Although the areas under these curves, measured as years-squared, are not conventional indices of public health, as estimates of total life expectancy experiences they help confirm Jackson's assessment that Portsmouth was "as healthy a place as any in America, or perhaps on the globe," as shown in Figure 5.

The principal difference between life expectancies in the 18th and 20th centuries is the lesser life expectancy among young children two hundred years ago. The high prevalence and mortality of infectious diseases then, coupled with the complete inability of eighteenth-century physicians to provide definitive therapy for patients with those diseases, contributed to this difference, which is well known today. At about the time that Jackson, Spalding, and Thurston were collecting their data, Malthus correctly attributed at least a portion of the differences in mortality rates among urban and rural dwellers to the high mortality rates among children, especially the children of the poor, who were found in the greatest numbers in the larger cities.[34]

The total life expectancy experience data summarized in Figure 5 show that longevity in Portsmouth during the late eighteenth and nineteenth centuries was about what would have been expected in a community of its size, consistent with the death rates shown in Figure 3. That is, Portsmouth was, indeed, about average in terms of healthiness as measured by life expectancies, among the cities and towns in America and Europe for which data

---

[33] For an eighteenth-century example of the use of mortality statistics in the computation of annuities, see W[eyman] L[ee], *An Essay to Ascertain the Value of Leases and Annuities for Years and Lives* . . . (London: S. Birt, D. Browne, and J. Shackburgh, 1737).

[34] Malthus, *op cit.* (n. 8 above), p. 25.

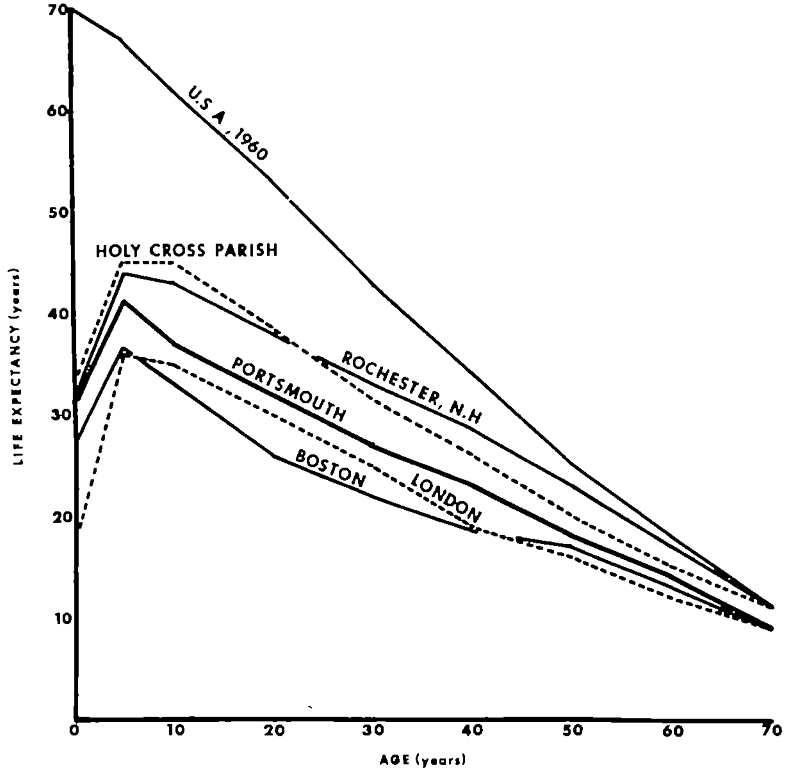

Fig. 4. Representative life expectancy curves for Portsmouth, N. H., and larger and smaller American and European communities in the eighteenth century, with modern American data. Holy Cross Parish is near Shrewsbury, England. Calculated from data in references cited in notes 4, 5, 12, 15, and 26.

were then and are today available. But it was the size of Portsmouth's population, and its density, that seem to have been the chief determinants of its relative life expectancy. Residents of larger American and European cities had shorter life expectancies than did those of Portsmouth. Conversely, inhabitants of smaller towns on both continents had greater life expectancies than those of larger cities.

Figure 6 shows life expectancy curves for men and women in eighteenth-century Portsmouth and Stockholm, and in twentieth-century America. Although the greater life expectancy among twentieth-century women, when compared to that of men, is generally recognized, women did not enjoy the same advantage of longevity in Revolutionary Portsmouth. Indeed, the men of Portsmouth had the advantage from the fourth decade of life on.

The sex difference in longevity between Portsmouth and other contem-

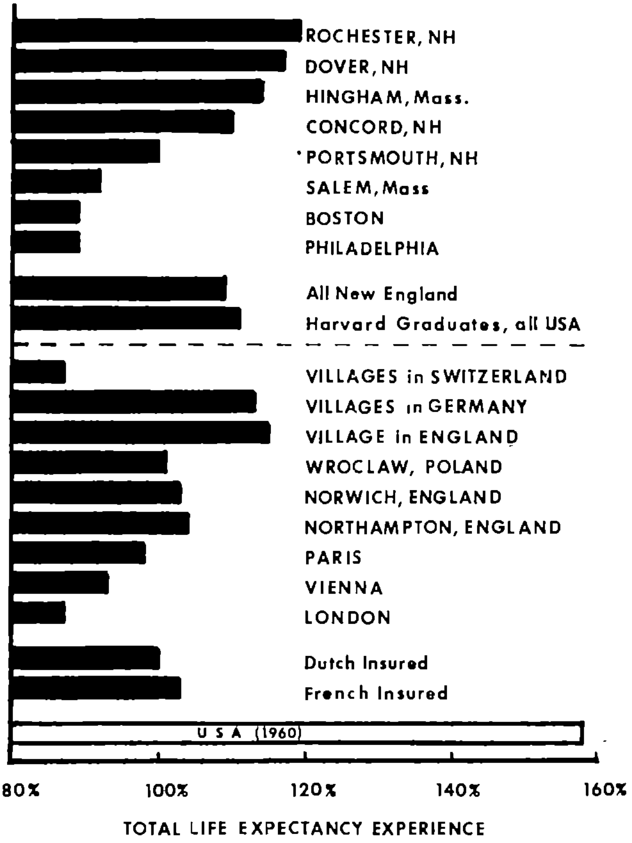

Fig. 5. The total life expectancy experience, measured as the areas under life expectancy curves (see, e.g., Figure 4), for 21 eighteenth-century and early nineteenth-century American and European communities, arranged in order of increasing population density from top to bottom, for both continents. Compiled and calculated from data in references cited in notes 4, 5, 12, 15, 26, and 27.

porary towns cannot be attributed only to the greater hazard of sex-specific conditions, such as childbirth, to which women were subject 150 years ago; that would have been applicable to all communities. The bills of mortality show that the incidence of fatal cases of puerperal fever was very slight then (7.6 per 100,000 deaths), much less than we now commonly suppose. In fact, only in Portsmouth, of all the eighteenth-century communities for which we have data, did the difference in longevity between the sexes increase over the last years of life after the peak child-bearing period. For other communities, life expectancy curves for men and women begin to converge after the age of about 50.

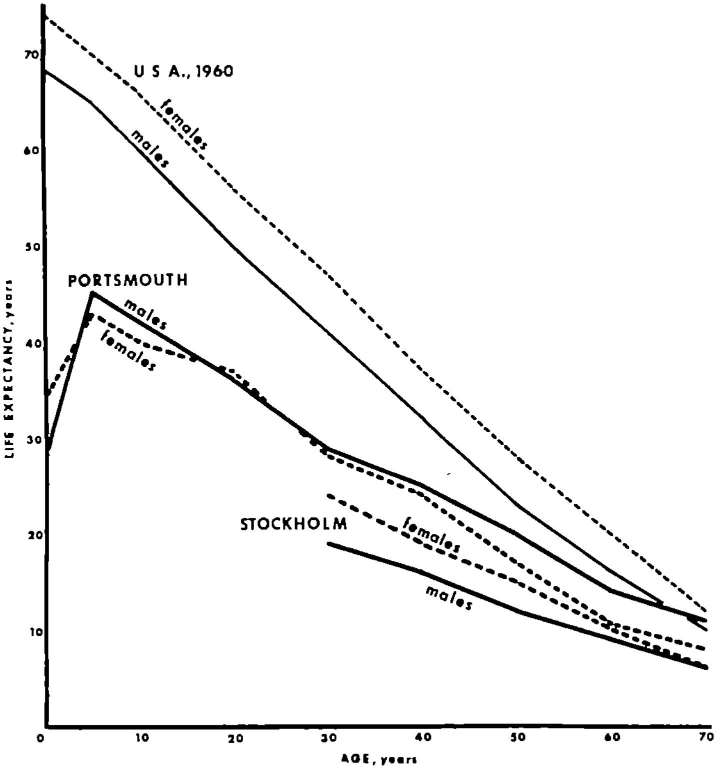

Fig. 6. Representative life expectancy curves for men and women in Portsmouth, N. H., 1801-20, eighteenth-century Stockholm, and twentieth-century America. Calculated from data in references cited in notes 4, 5, 12, and 15. Contemporaneous data for all Sweden, and for Chester, England (cited in n. 12), can be superimposed on the data for Stockholm.

In the absence of other data, then, we can infer that the women of Portsmouth lived under some biological disadvantage that was not necessarily related to any sex-specific disease. What might it have been?

When Jacques-Pierre Brissot de Warville visited America in 1788, he set about collecting data to support his hypothesis that the quality of life in a republic that had just won its independence from an oppressive government was better than under that oppression. Brissot surmised that American women, including those in Portsmouth, were more likely than American men to contract consumption, because they took less exercise than men (thereby demolishing one of our favorite legends about our pioneer ancestresses).[35] In fact, chi-square analysis of the data in the Portsmouth bills of mortality shows that a disproportionate number of Portsmouth women, but not men, died of consumption, but not of other infectious diseases. Brissot used the observation that American women indulged in what he thought was an insufficient amount of exercise to suggest that women were not the biological equals of men. When he extrapolated further to suggest that neither were women the intellectual or political equals of their husbands, he was only constructing a syllogism; he does not deserve to be accused of being a male chauvinist.

---

[35] Brissot de Warville, *op. cit.* (n. 12 above), pp. 280, 369.

Post-Revolutionary American newspapers and magazines delighted in reporting extreme examples of American longevity. The long life was generally equated with the good life, in terms of health, morals, and the ease of making a living in the American Eden. Books on how to attain great age were best-sellers in the eighteenth century; Luigi Cornaro's *Probable Way of Attaining a Long and Healthful Life* was reprinted even in Portsmouth, in 1788.[36]

When Brissot looked at the relatively greater life expectancy for Harvard graduates, regardless of where they lived, than for other populations, he rhapsodized that "one can logically induce the causes of longevity: regularity of morals, an enlightened mind, independence of spirit, and freedom from want."[37]

Timothy Dwight's conclusion about the American frontier at the end of the eighteenth century was a hymn of nationalistic fervor soundly based on both epidemiologic data and political theory: "Thus rational and virtuous man sees his race multiplying beyond all customary calculation, in the midst of blessings equally and universally diffused, and obtained without fraud, without oppression, and without blood."[38] In this respect, Dwight was a Romantic, although I suspect that he might have shuddered at that label.

Hall Jackson's concept of the relative healthiness of his own community can be equally well confirmed, by the same kinds of hard data. It is not possible to prove that he had actually seen many of the published data, but he may have done so. It is more likely that Jackson's years of making scientific observations, combined with his years of political commitment to the idea of an independent United States, underlay his conclusion. In the twentieth century it has become even more urgent to explore and exploit the relationship between health and society.

---

[36] R. B. Austin, *Early American Medical Imprints 1668-1820* (Washington, D.C : U.S. Department of *States Life Tables* (n. 31 above).

[37] Brissot de Warville, *op cit* (n. 12 above), p. 284.

[38] Dwight, *op. cit.* (n. 11 above), vol. 2, p. 212.

POLITICS AND PUBLIC HEALTH: SMALLPOX IN MILWAUKEE, 1894-1895*

JUDITH W. LEAVITT

Smallpox was to Milwaukee what cholera and yellow fever were to other nineteenth-century American cities. It was an infrequent visitor, but when it came, smallpox caused major disruptions of city life and generated fear and panic among the residents. The effects of smallpox epidemics were typically to increase the powers and effectiveness of the health department. John Duffy, Charles Rosenberg, and others, have indicated this pattern with regard to cholera and yellow fever epidemics.[1] I have found it also explains the impact of smallpox in Milwaukee. As a result of five nineteenth-century smallpox epidemics, health officials greatly increased their authority to control infectious diseases in Milwaukee.[2]

However, the smallpox epidemic which hit Milwaukee in the summer and fall of 1894 interrupted this pattern. As a direct result of that epidemic, the powers of the health department were significantly diminished, and its reputation in the city sank to an all-time low. This 1894 example, I think, serves to dramatize the relationship between politics and public health and to remind

---

* This is a revised version of a paper presented at the annual meeting of the American Association for the History of Medicine, Philadelphia, May 1, 1975. The research was aided in part by a Maurice L Richardson Fellowship from the University of Wisconsin

[1] Charles Rosenberg, studying the effects of cholera epidemics on American cities, noted: "The cholera epidemics of the nineteenth century provided much of the impetus needed to overcome centuries of governmental inertia and indifference in regard to problems of public health . . . . It is not surprising that the growing public health movement found in cholera an effective ally." *The Cholera years: The United States in 1832, 1849 and 1866* (Chicago: University of Chicago Press, 1962), pp. 2-3. See also John Duffy, who posits that cholera and yellow fever were "important factors in promoting public health measures," because of their "crisis" presentation "The social impact of disease in the late nineteenth century," *Bull. New York Acad. Med.*, 1971, *47*: 800. Although Duffy saw smallpox running a poor third to cholera and yellow fever, in Milwaukee smallpox took the place of the former two diseases which did not threaten the city after 1850. I make the parallel with cholera and yellow fever despite the major differences between those diseases and smallpox, the availability of a preventative for one and not the others. While vaccination raises interesting differences between the examples used here, those differences did not affect the public reaction evoked in each case: fear and panic and an immediate governmental response to alleviate conditions.

[2] Smallpox first appeared in Milwaukee in 1843, and reappeared three years later in virulent form A major epidemic occurred in 1868, immediately after the Board of Health was established, and was responsible for establishing certain power patterns which were to remain throughout the century. During the 1870s Milwaukee suffered two major outbreaks of smallpox. Despite the fact that smallpox was never a major cause of death in Milwaukee, it aroused more interest on the part of the public authorities and was responsible for more public health legislation than any other disease

BULLETIN OF THE HISTORY OF MEDICINE 50 553-568 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

us that medical factors do not alone determine the course of public health events.

The 1894 Milwaukee smallpox epidemic illustrates the dependence of nineteenth-century public health on political circumstances. Moreover, it shows that epidemics could have had—and occasionally did have—retrogressive as well as progressive effects on the development of the public health movement.

A frightening disease, with ugly physical manifestations, smallpox attacked all ages and, exacerbated by unsanitary conditions and overcrowding, spread quickly through a city. Victims who did not succumb to the disease were often left disfigured and pockmarked for life. But in the nineteenth century, smallpox was a preventable disease, since vaccination with cowpox virus was available. Thus one would not expect smallpox still to be a disease of dread. However, although vaccination was quite widely used, it was not universally accepted in the medical community or among the lay public. Most medical practitioners advocated vaccination, but many thought it an inadequate protection against the disease; some anti-vaccinationists claimed it to be more harmful than the disease itself.[3]

Milwaukee newspapers aired the disagreements within the medical community over vaccination and about treatment of smallpox, and the result was a confusion which seemed to grow as the century wore on. The presence of a large immigrant community in the city, among whom the efficacy of vaccination was most frequently questioned, merely increased dissension.[4]

The infrequent appearance of the disease and the confusion about medical theory account for a large part of the reaction Milwaukeeans had to smallpox. But the particular political circumstances which greeted the outbreak of an epidemic in the city also generated fear. Divided opinion among the people about how to react to the disease, and over whether or not to vaccinate occasionally furthered already existing political and ethnic divisions in the city. In 1894, the Milwaukee health department found it difficult to control a medical situation because of its political ramifications.

---

[3] See Martin Kaufman, "The American anti-vaccinationists and their arguments," *Bull. Hist. Med.*, 1967, *41:* 463-478. Kaufman describes most anti-vaccinationists as irregular practitioners, and identifies the movement with sectarian medicine. It is not clear to me that that division holds in Milwaukee where many regularly trained physicians were hesitant about the protective value of vaccination throughout the nineteenth century.

[4] *Ibid* , p. 474, Kaufman also noticed the prevalence of strong antivaccinationist sentiment among the immigrants, specifically among the German immigrants. Not only were immigrants in Milwaukee vocal against vaccination, but other governmental health activities also drew their wrath. Placarding a home containing an infectious disease, removing sick to an isolation hospital, requiring private night burials, were all seen by newly arrived Germans and Poles as direct infringements on their personal liberties and were vigorously resisted in Milwaukee. For more on this reaction of Milwaukee immigrants, see my Ph.D. dissertation, "Public Health in Milwaukee 1867-1910," University of Chicago, 1975. The reaction was found throughout the state of Wisconsin. See, for example, the *Sixth Annual Report of the State Board of Health of Wisconsin*, 1881, pp. 116, 120; and the *Fifteenth Annual Report of the State Board of Health of Wisconsin*, 1894-1895, pp. 138-139, 163.

Milwaukee in the 1890s was a bustling commercial and industrial city. Its population jumped from 20,000 at mid-century to 115,000 by 1880, and to 285,000 at the turn of the twentieth century. By 1910, Milwaukee was the twelfth largest city in the United States. Contrary to popular belief, its economy was based only partly on beer; other heavy and light industries also flourished.[5] Milwaukee contained members of almost every ethnic group which migrated to this country, with Germans and Poles predominating. Many have noted the German character of nineteenth-century Milwaukee.[6] Although most of its population lived in single-family, or two- to three-family dwellings, Milwaukee was very much an urban metropolis in the 1890s. Like all other cities in the United States during the period, it wrestled with the problems of housing congestion, street sanitation, and disposal of wastes.

In 1894, a Republican victory at the polls led to the appointment of a new Health Commissioner, Walter Kempster, a Republican and a nationally known physician and psychiatrist. Although best known for his work with the insane, Kempster had spent much time studying how Europeans dealt with contagious diseases, especially cholera, and the new mayor felt that a man of such stature would be an asset to the city.[7]

The Common Council immediately questioned Kempster's appointment. Democrats might have been expected to oppose a Republican appointee as a matter of course; but Kempster's strongest opposition came from fellow Republicans, most vociferously from aldermen Robert Rudolph and Charles

---

[5] For more on Milwaukee's economy see Bayard Still, *Milwaukee: The History of a City* (Madison: The State Historical Society of Wisconsin, 1965) and Roger David Simon, "The Expansion of an Industrial City. Milwaukee, 1880-1910," unpublished Ph.D. dissertation, University of Wisconsin-Madison, 1971.

[6] On the German population of Milwaukee and its assimilation, see Gerd Korman, *Industrialization, Immigrants and Americanizers: The View from Milwaukee 1866-1921* (Madison: The State Historical Society, 1967) and Kathleen Neils Conzen, "The German Athens: Milwaukee and the Accommodation of its Immigrants 1836-1860," unpublished Ph.D. dissertation, University of Wisconsin-Madison, 1972.

[7] Walter Kempster had only small ties of any kind to the city of Milwaukee. He had a national reputation as physician to the insane and had held posts at the State Lunatic Asylum at Utica, New York, and at the Northern Hospital for the Insane, at Oshkosh, Wisconsin. He had testified for the prosecution in the Guiteau case. He had moved to Milwaukee in 1890, but since that time had been on two missions abroad studying cholera and investigating Jewish emigration from Russia. His tenure in the city of Milwaukee, his critics were quick to point out, had been short indeed. For biographical material on Walter Kempster see the *Dictionary of American Biography* (New York: Charles Scribner's Sons, 1933) *10*, pp. 324-325; Howard Kelly and Walter Burrage, *American Medical Biographies* (Baltimore: The Norman, Remington Co., 1920), pp. 652-653, and most thoroughly, F. M. Sperry, *A Group of Distinguished Physicians and Surgeons of Milwaukee* (Chicago: J. H. Beers & Co., 1904), pp. 56-69. See also Kempster's obituary, Milwaukee *Sentinel*, August 23, 1918, and *The New York Times*, August 23, 1918, p. 9. Kempster was buried in Arlington National Cemetery

Kieckhefer, both representing German wards.[8] Both men criticized the fact that Kempster was new to Milwaukee and unfamiliar with the city and its problems. They opposed his appointment initially because they had supported other local physicians for the job. Kempster's English heritage and national reputation acted against him in the minds of those who sought a familiar, and possibly ethnic, representative of Milwaukee's population. But the majority of the Council was willing to give Kempster a chance, and confirmed his appointment by a vote of 23 to 13.[9]

With the nation and the city in the middle of a severe economic depression in 1894, the 26 patronage jobs controlled by the Health Commissioner assumed great significance. Although Kempster was a Republican, he was not susceptible to the influences of fellow party members. In fact, when he announced his appointees, he completely ignored the party's suggested lists. Council members immediately challenged the appointments over which they had consent powers, and vetoed some of them, early establishing the pattern which was to typify Kempster's relations with the legislative body.[10]

As a result of this episode, tension existed between the health department and the Common Council in June 1894 when the incidence of smallpox began to increase and an epidemic threatened. The atmosphere of cooperation, necessary to cope successfully with an emergency situation, was missing. Smallpox became the weapon with which certain members of the Common Council, led by south side saloon keeper Robert Rudolph, fought the Health Commissioner. The Polish and German immigrant groups most hard hit by the epidemic furnished the movement's political strength.

Dr. Kempster's reaction to smallpox in the city was similar to that of health commissioners before him. He at once hired extra physicians to launch a widespread vaccination campaign. He moved swiftly to isolate those patients reported to have the disease by removing them to the Isolation Hospital in the eleventh ward, acting under the 1892 ordinance giving him the power to do this forcibly if necessary. And he enforced a strict quarantine on those allowed to remain at home. The department also carried on extensive patient education campaigns and made wide use of the city's disinfecting van.[11]

---

[8] Milwaukee *Sentinel*, April 17, 18, 24, 30, 1894.

[9] Eight Republicans opposed and five Democrats supported Kempster. Without Democratic support, the Republican nominee would not have been confirmed. Milwaukee *Common Council Proceedings*, April 30, 1894 See also the Milwaukee *Sentinel*, May 1, 1894.

[10] Milwaukee *Sentinel*, June 12, 26, 1894; Milwaukee *Common Council Proceedings*, June 11, 1894, p. 132; May 14, 1894, p 61.

[11] *Seventeenth Annual Report of the Milwaukee Health Department*, 1894, pp. 26-32; *Eighteenth Annual Report of the Milwaukee Health Department*, 1895, pp. 10-12; *Eighteenth and Nineteenth Annual Report of*

The reaction of citizens to the health department's offensive was initially similar to the response during previous outbreaks. They cooperated with everything but vaccination, which the German and Polish areas of the city resisted. The health department had no authority to force vaccinations on anyone who did not want them, although non-vaccinated children could be refused admission to the public schools. Since the epidemic began just when the public schools were closing for the summer, this restraint was not particularly effective.[12]

During June and July, smallpox appeared in all sections of the city, keeping the health department busy vaccinating and isolating reported cases. Kempster was confident that his procedures were effective, and that an epidemic would not materialize. But by mid-July it was evident that a significant number of people were not cooperating with the health authorities. Many cases of smallpox went unreported. Discontent with health department policy grew when smallpox seemed to localize in the south side wards. The one hardest hit by the contagion was the eleventh ward, site of the Isolation Hospital and home of Alderman Rudolph.

At first Kempster denied that there was a seat of infection in the south side, but the numerous cases discovered there belied his assertions. Significant numbers of parents refused to allow their children to be examined or vaccinated by health officials, contributing to the rapid spread of the disease.[13] The immediate focus of the people's wrath was the Isolation Hospital in the crowded eleventh ward. Despite the renovations that had recently transformed the institution into what health authorities called a "modern facility," residents in the neighborhood still viewed it as a "pesthouse" and the source of their trouble. They claimed that it was a "menace to the health of citizens" and a "slaughterhouse" where patients "were not treated like human beings." Health officials maintained that the hospital was in good condition and offered good service to the sick poor who were admitted.[14] Whatever the actual condition of the hospital in July and August 1894,

---

the Health Department, 1895, pp. 35-39 Milwaukee *Sentinel*, June 28, July 4, 1894 Physicians were urged to cooperate with health officials in reporting the disease. The health commissioner closed schools when he thought it necessary. See the Milwaukee *Sentinel*, September 2, 3, November 3, 13, 24, 1894 See also the Milwaukee *School Board Proceedings*, November 6, 1894, pp. 124-125.

[12] At least two German language newspapers argued that vaccination did not protect against smallpox and that its effects were often worse than the disease it was to prevent. The Anti-Vaccination Society disseminated its information through pamphlets widely circulated in three languages Milwaukee *Sentinel*, August 1, 1894.

[13] Milwaukee *Sentinel*, July 23, 1894. See also, July 24, 1894.

[14] Milwaukee *Sentinel*, August 3, 4, 6, 1894. The anti-hospital sentiment expressed by residents of the south side reopened a familiar Milwaukee debate about moving the hospital outside the city limits. The issue flared up, encompassed much time for the city's legal staff, and was finally dropped at the end of the summer. Most

southsiders were convinced that it was a death house for those who went there as patients and that its presence infected the nearby districts.[15]

A crisis was reached on August 5 when a crowd of neighbors successfully resisted an attempt by the health department to take a sick two-year-old to the hospital. About 3000 "furious" people armed with clubs, knives, and stones assembled in front of the child's house. The family had recently lost a child after it had been removed to the hospital, and the mother was frantic with fear and determined not to let the city "kill" (as she put it) another of her children. "I can give it better care and nourishment here than they can give it at the hospital. I will not allow my child to be taken to the hospital." Faced with the violent mob, and unable to control the situation, the ambulance on this occasion beat a hasty retreat.[16]

There is no evidence that Alderman Rudolph was in any way connected with the initial outburst on the night of August 5. But by the next day his name was being intimately linked with the southside "rioters," and he was participating actively to organize and mold the political force unleashed in his ward. On August 6, he introduced a resolution in the Common Council to remove the power of the Health Commissioner to take patients to the hospital against their will. Although the resolution had no effect against the ordinance which gave the power, its adoption was seen as a vote of support of the southsiders.[17] Rudolph appeared as a leader at public rallies, and on August 7, when a crowd gathered to protest the night burial of a smallpox victim, Rudolph addressed them with a speech that "was not entirely free from incendiarism." With his support, southsiders continued actively to protest health department activities.[18]

---

physicians were against removal from the city limits, as long distance travel was not seen as beneficial to an acutely ill patient, nor was it convenient for phsyicians.

[15] The theory of air-born contagion is not yet disproved as one way in which the smallpox virus might travel It has also been shown that flies have acted as vectors in spreading the disease. See Cyril W. Dixon, *Smallpox* (London. J & A Churchill, 1962), p. 264 This theory was supported at the time because the eleventh ward was, in fact, the main seat of infection in the city Certainly, popular opinion very strongly blamed the Isolation Hospital for the large number of smallpox cases on the south side. See the Milwaukee *Sentinel*, August 4, 1894.

[16] The mother is quoted in the Milwaukee *Sentinel*, August 6, 1894. For more on the episode, see the *Eighteenth and Nineteenth Annual Report of the Milwaukee Health Department*, 1895, pp. 42-43 For a brief popularized account of the riots, see Richard L Stefanik, "The smallpox riots of 1894," *Historical Messenger*, December, 1970, pp. 123-128.

[17] Milwaukee *Common Council Proceedings*, August 6, 1894, p. 326. See also the Milwaukee *Sentinel*, August 7, 1894; and the *Eighteenth and Nineteenth Annual Report of the Milwaukee Health Department*, 1895, pp. 41-42. The initial ordinance had been passed in reaction to a cholera scare in the city in 1892, and had never been used.

[18] For more on the August 7 rally, see the Milwaukee *Daily News*, a workingman's newspaper, which

Dr. Kempster reacted by stiffening the official position, insisting that if smallpox spread it was not due to health department negligence but rather to the rioters themselves spreading the contagion through the southside wards. He carefully defended every argument leveled at the department, and told a reporter, "But for politics and bad beer, the matter would never have been heard of."[19] This belittlement of an issue as crucial as life itself to the southside residents did little to ease tensions between the health department and that section of the city. In fact, it emphasized the differences—class and ethnic—between Kempster and the immigrant southside residents. Showing little compassion, Kempster remained firm during the entire episode, never bending to the southsiders, never recognizing that their concerns may have been legitimate. "I am here to enforce the laws," he said, "and I shall enforce them if I have to break heads to do it. The question of the inhumanity of the laws I have nothing to do with."[20]

The situation on the south side clearly aided the spread of smallpox in that region of the city. Daily, crowds of people took to the streets, seeking out health officials to harrass. Quarantine officials watching guard over houses were frequently the object of the mob's attack. With thousands of people roaming the streets and entering houses infected with smallpox, the contagion was destined to spread throughout the district. Case reports, despite the many concealed from authorities, indicate that the southside wards eleven and fourteen were most severely hit during the summer and fall of 1894[21] (Fig. 1).

The focus of the crowds' hatred was Dr. Kempster. He symbolized arbitrary governmental authority which was subverting immigrant culture and threatening personal liberty. Calling for his execution, crowds demanded that the "people's rights were paramount and should be protected, if need be, at the point of a pistol."[22] Women played a particularly important part in the disturbances. Since police were reluctant to use their clubs on "feminine shoulders," women were effective at maintaining disorder. Armed with clubs and stones, they assaulted the city police sent to preserve order. They threw stones and scalding water at the ambulance horses in an effort to stop

---

tended to support the rioters, but not the riots in early August "There is reason to believe that there has been some basis for the many criticisms . . . made." (August 8, 1894). The *Sentinel*, however, was quick to blame the "ignorance of the people" in not following existing health regulations and in defying authorities. (August 8, 1894)

[19] Milwaukee *Sentinel*, August 7, 1894.

[20] Quoted in the Milwaukee *Daily News*, August 11, 1894.

[21] Out of a total of 1,074 cases, 846 were from south side wards—half of these were from the eleventh ward.

[22] Milwaukee *Sentinel*, August 9, 1894.

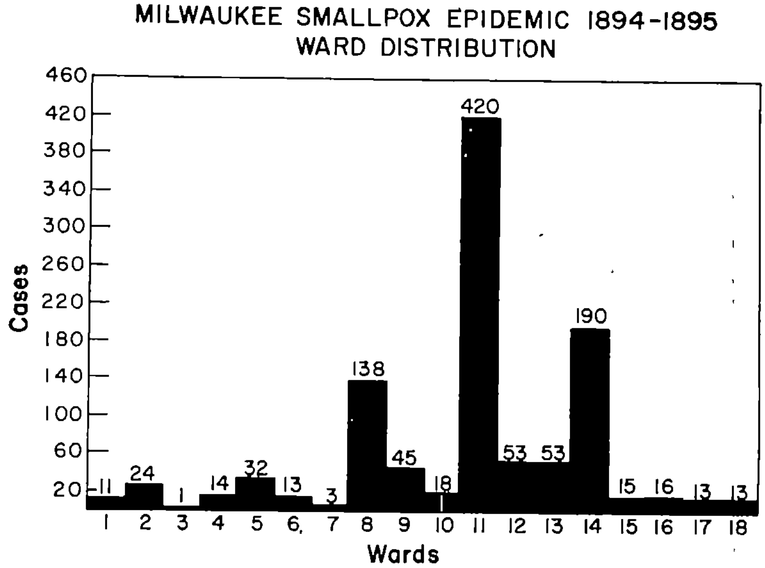

Fig. 1. Wards 5, 8, 11, 12, 14 and 17 were on the south side.

officials from removing any patients. As one newspaper observed the situation: "Mobs of Pomeranian and Polish women armed with baseball bats, potato mashers, clubs, bed slats, salt and pepper, and butcher knives, lay in wait all day for . . . the Isolation Hospital van"[23] (Fig. 2).

City officials met daily to try to determine a course of action which would stem the riots and the spread of smallpox. They consulted the State Board of Health. Despite their efforts, the disturbances continued intermittently through August and into September.[24]

In addition to governmental meetings, southside citizen groups met to try to regain the image of that section as a peaceable place, safe for business. Deeply regretting "the notoriety which has been recently thrust upon that section of the city," one such meeting blamed the carelessness of the people for spreading the disease. Even the moderate groups, however, were not in sympathy with the health department, which, it was felt, had lost the confi-

---

[23] Milwaukee *Sentinel*, August 30, 1894. For more on the role of women in the rioting, see the *Sentinel*, August 10, 12, 1894; and the Milwaukee *Daily News*, August 10, 1894.

[24] For details about the involvement of the State Board of Health, see the *Wisconsin State Board of Health Report*, 1893-1894, "Report of the Executive Committee Relative to the Smallpox Situation in the City of Milwaukee," pp. 56-69; U.O.B Wingate, "Smallpox in Wisconsin from January 1894 to June 1895," *Public Health: Papers and Reports of the American Public Health Association*, 1896, *21:* 268-272, and the *Eighteenth and Nineteenth Annual Report of the Milwaukee Health Department*, 1895, pp. 49-58; and the Milwaukee *Sentinel*, August 11, 12, 14, 1894.

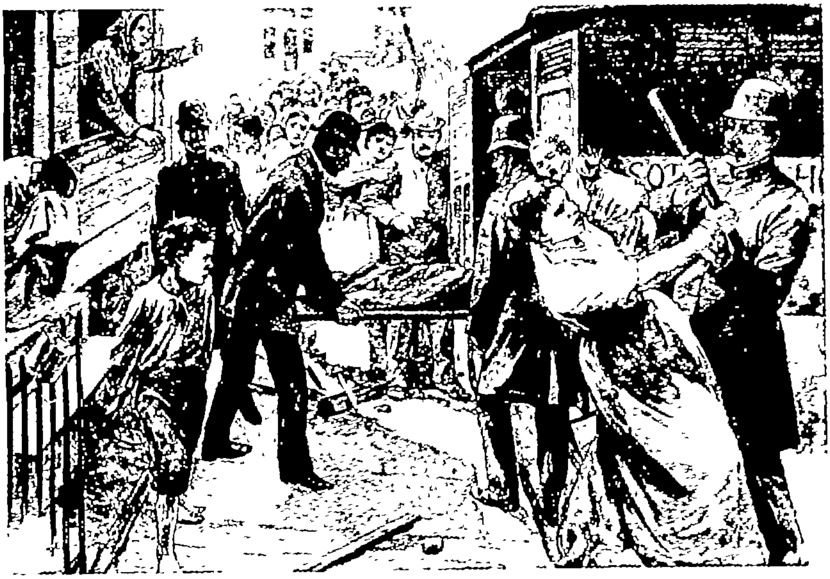

Fig 2. "Smallpox Troubles in Milwaukee." From *Leslie's Weekly Illustrated Newspaper*, September 27, 1894, *79:* 207 I am grateful to Martin S. Pernick and Janet S. Numbers for help in locating this illustration.

dence of the people and was thus no longer competent to deal with health emergencies.[25]

The activity in the eleventh ward diminished the effectiveness of the health department. Kempster himself admitted that although smallpox had been under control before the riots, quarantine was impossible and the spread of the disease inevitable since the mobs began roaming the streets.[26] Vaccinations, although freely available, were often rejected. During the violence on the south side the daily work of the health department virtually came to a halt. Patients could not be removed to the hospital in the face of weapon-wielding mobs; patients from other wards in the city could not be transported to the hospital through the hostile eleventh ward.[27] Kempster was denounced for attempting to remove patients to the hospital, and further denounced when failure to remove such patients resulted in the spread of the epidemic.

To a meeting of concerned physicians and businessmen, he voiced his frustrations:

---

[25] Milwaukee *Sentinel*, August 12, 14, 1894

[26] Milwaukee *Sentinel*, August 12, 1894.

[27] *Evening Wisconsin*, August 29, 1894

> The laws are not enforced because the Common Council has prevented me. Not a single proposition that I have made . . . has been acted upon . . . . Proposition after proposition has been made to revise the laws as they now are. This has caused opposition among the people. We come to a house to remove a patient and are resisted. They tell us that their alderman informed them that next week the laws will be changed and they need not go. I have been tied hand and foot with investigations, injunctions and work that is never finished.[28]

At the beginning of September, with the opening of school, the coming of cooler weather, and increased police action against the rioters, the roving mobs on the south side became less visible. The focus of the anti-Kempster movement changed from street action to the Common Council, as that body took up the battle in earnest.

Alderman Rudolph maintained a hold on his constituency and leadership of the mass movement against the health department by his actions and inflammatory rhetoric within the Common Council. There he introduced resolution after resolution and ordinance after ordinance, each one concerned with limiting the power of the health department and Walter Kempster. As a member of the Council Health Committee and as a close friend of Council President William G. Rauschenberger, Rudolph had considerable influence over health measures in the Council.

Beginning with the measures introduced on August 6 attempting to limit Kempster's power to remove patients to the hospital, Rudolph's actions crescendoed as the epidemic itself increased in intensity. In early September, he introduced an ordinance designed to accomplish what his earlier resolution could not: legally to tie the hands of the Health Commissioner by not allowing him to remove patients without their consent. The ordinance, revised slightly, passed the Council and became law.[29]

---

[28] Quoted in the *Sentinel*, October 23, 1894.

[29] Milwaukee *Common Council Proceedings*, September 4, October 1, November 26, 1894. See a copy of the ordinance as passed in the Appendix to the 1894-1895 *Proceedings*, pp. 22-23. Section I provided. "The commissioner of health shall not remove to any Isolation Hospital in said city any child or person suffering from any such disease who can be nursed and cared for during such illness in his or her home during the continuance of the disease except upon the recommendation and advice of the said commissioner of health or one of the assistant commissioners of health, and the physician, if any, attending upon such child or person, not being a member of the health department of said city; and in case such commissioner, or assistant commissioner and such physician shall be unable to agree as to the advisability of removing such child or person, then they shall call in and appoint another physician not a member of the health department, and the decision of the majority of such physicians and commissioner or assistant commissioner shall be decisive of the question. The third physician called in, as above provided, shall not receive or be entitled to any fees from the city for consultation or service in the decision of the case submitted to such board of physicians " The conditions were so burdensome they effectively tied the hands of a health commissioner attempting to act swiftly to stem an epidemic.

Part of Rudolph's success in passing this ordinance was due to his scare tactics. The only member of the Council in daily touch with the rioters, he promised renewed violence if the Council did not pass his measure. He emoted loud and long on the injustices of tearing a child from its mother's breast. And he convinced his fellow politicians that voters would not be happy unless this measure passed. Council President Rauschenburger, who also thought Kempster incapable of handling the epidemic, actively supported Rudolph.[30]

In October, with the epidemic still raging about the city, Rudolph called for a special investigating committee to inquire into Kempster's activities, listing 34 charges against him.[31] The main charges were that Kempster had been negligent of his duties in the management of the Isolation Hospital, that he showed ignorance of quarantine methods, that patients were removed from their homes when they could have been better taken care of at their residences, and that the health department had grown tyrannical.[32] Twenty-eight physicians, including some of the more "prominent" physicians in the city, signed testimonials of misconduct on the part of the Health Commissioner.[33] Rudolph's charges were a serious matter.

Rudolph himself was appointed chairman of the Council's committee to investigate the charges. The impeachment proceedings were front page news in all the city's newspapers. Although most English-language papers declared that the investigation was a "farce" since it was led by so prejudiced a man, even the friendly *Sentinel* agreed that there was a need to clear the air.[34] The German language press, on the other hand, endorsed Rudolph from the start and fully supported the impeachment proceedings.[35]

---

[30] Milwaukee *Sentinel*, September 4, 5, October 2, 6, 7, 9, December 2, 1894 *Evening Wisconsin*, October 8, 1894. See also *Eighteenth and Nineteenth Annual Report of the Milwaukee Health Department*, 1895, p. 69; and the Milwaukee *Common Council Proceedings*, September 4, 1894.

[31] Milwaukee *Common Council Proceedings*, October 15, 1894, pp. 524-531. Although the two actions discussed here, ordinances for the removal of patients and impeachment, were not the only ones Alderman Rudolph initiated against the Health Commissioner, they were the most important, and thus form the focus of the discussion here. For additional measures the Council considered at Rudolph's initiation, see *Common Council Proceedings*, August 20, 1894, pp 364-365; September 4, 1894, pp. 374-375; October 15, 1894, p 497, October 29, 1894, p 571; November 12, 1894, p. 583. See also the Milwaukee *Sentinel*, August 21, September 1, October 2, 13, 1894

[32] Milwaukee *Sentinel*, October 16, 1894.

[33] Of the 28, at least 19 were members of the local medical society, the State Medical Association or the American Medical Association. See the membership list of the Milwaukee Medical Society and the local AMA members in the archives of the Milwaukee Academy of Medicine. The membership list of the State Medical Society was in the *Wisconsin Medical Journal* 1903-1904, pp. 196-208 At least two of the physicians had been brought to court by Kempster, charged with not reporting smallpox, which might account for their hostile position

[34] See the Milwaukee *Sentinel, Daily News* and *Evening Wisconsin*, passim, October 15, 1894, to February

Rudolph's allies included the Anti-Vaccination Society, the German language press, and the southside activists. There were many physicians among this group. Their leader was Dr. Emil Wahl, a German physician with a successful southside practice. Dr. Wahl was a member of the Milwaukee Medical Society (although he resigned from that organization when it accepted Kempster as a member), and his accusations that Kempster was incompetent to deal with the epidemic could not be dealt with lightly.[36]

There were genuine differences among physicians about the treatment of smallpox patients as there had been on the vaccination issue. The division in the medical community was one between men of good faith, similarly trained, who used the tools of their profession to come to opposing conclusions. Dr. Wahl may or may not have not been politically motivated to speak publicly against Dr. Kempster, but this does not necessarily mean that his medical disagreements were less real. His arguments were serious ones, which the medical community seriously debated. Wahl's principle complaint was that Kempster was responsible for discharging patients from the hospital while they were still contagious, thus aiding the spread of the disease. The debate centered on the condition of the smallpox pustule at the various stages.

The epidemic reached its height during the month of October, when the impeachment hearings began. Southside physicians, led by Emil Wahl, gave testimony about patients who had been prematurely dismissed from the hospital. Kempster's cross examination of these witnesses attempted to show their lack of familiarity with the disease and their inability to recognize its contagious states.[37] Witnesses also included southside families who felt wronged by the health department because it had attempted to remove their relatives to the hospital. It was claimed that Kempster had attempted to remove one patient who was not even ill with smallpox. A nurse who had

---

21, 1895 See, for example, editorial of January 5, 1895, in the *Sentinel* entitled, "The Farce Continued." Other newspapers voiced similar sentiments. The (Milwaukee) *Catholic Citizen* ridiculed the matter of putting the "prosecuting attorney on the bench as the judge of the case." October 20, 1894

[35] See, for example, *Seebote* and *Herald*, passim, in these months.

[36] For biographical material on Emil Wahl, see Louis Frank, *The Medical History of Milwaukee 1834-1914* (Milwaukee: Germania Press, 1915), p. 72. He appears on the membership list of the Milwaukee Medical Society, having joined the organization in 1888. For more on Wahl's resignation, see the Milwaukee Medical Society minutes, January 22, 1895, and February 12, 1895, in the archives of the Milwaukee Academy of Medicine.

[37] Milwaukee *Sentinel*, November 15, 16, 17, 28, 29, December 4, 5, 1894; January 4-16, 1895 See also the Milwaukee *Journal*, January 4-10, 1895.

served at the Isolation Hospital charged that the institution was mismanaged, that screens were not kept on the windows, and that its water supply was not adequate. In answering the charges against him, Kempster continued to deny any wrongdoing. The testimony of many leading physicians, including officers of the State Board of Health, supported him. The Milwaukee Medical Society also backed Kempster during the investigation. The Health Commissioner was obviously better able to withstand the public condemnations because of his medical colleague's approval.[38]

Judging that nine of the original 34 charges were sustained by the testimony, the investigation committee recommended conviction. Speculation ran high in the city about the Council vote on the impeachment question, with newspapers predicting the decision. Daily shifts of various aldermen were front-page headlines. The Council heard the relevant testimony for three days and nights consecutively. The exhausted aldermen were eager to be finished with the whole business. As the Council neared the vote, its president complained: "I am at a loss to know whether we are attending a circus or a session of the Common Council." Excitement ran high, interruptions were frequent, and disorder was rampant. Finally, in Feburary 1895, with the epidemic not yet over, the Council voted 22 to 14 to dismiss the Health Commissioner.[39]

Although the impeachment vote did not divide along party lines, the move against Kempster was nonetheless political. Patronage, class and ethnic divisions were responsible for a significant part of the opposition to Kempster in the city. Physicians who sought his post or appointments within the health department were disappointed and resentful of the man who held office, and Republican politicians were bitter because of their loss of influence in department appointments.[40] From the beginning of his tenure in office, Kempster had labored against a vocal opposition. When the epidemic struck the city, the opposition had a weapon to use to successfully resist the health officer. The issue of the Isolation Hospital was one which carried with it a tradition of anxiety and fear and was easily employed to gather support

---

[38] At a joint meeting, medical society members and business leaders hissed Rudolph's name while loudly cheering Kempster's. See the *Sentinel*, October 23, 1894. The transcripts of the impeachment proceedings are, unfortunately, lost, and it is impossible to discern the technical aspects of the medical debate from the newspaper accounts.

[39] For the press assessment of how the vote would be, see the *Sentinel*, February 14, 15, 16, 18, 1895; *Journal*, February 18, 1895; and the *Daily News*, February 18, 1895. See a description of the final session in the *Journal*, February 21, 1895; *Sentinel*, February 21, 1895.

[40] For contemporary arguments along these lines, see the Milwaukee *Sentinel*, August 30, 31, September 2, 4, 1894; February 20, 22, 1895, January 21, 1896; *Daily News*, August 31, 1894; *Journal*, February 19, 1895; *Catholic Citizen*, September 8, 1894

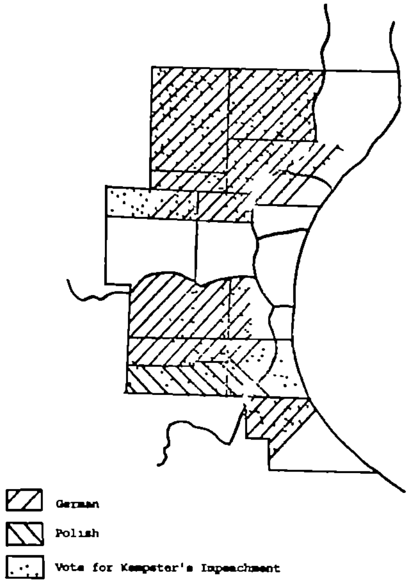

Fig. 3 Ethnic vote for Kempster's impeachment.

against Kempster. The issue of forcible removal of children from their homes was one that pulled at the heartstring of every immigrant parent.

The *Sentinel* termed the movement against Kempster a "cabal," and although it might be hard to document such a conspiracy, there is no question that Kempster's position in Milwaukee, while it may have been medically sound, was politically untenable. He had few friends and many enemies on the Common Council.[41]

Ethnic divisions in the city were evident from the differences in reactions between the English-language papers which supported Kempster and the German-language press which rejoiced over his dismissal.[42] Analysis of the impeachment vote shows that the ethnic divisions within the city held. Those wards which contained large numbers of German and Polish immigrants, or their descendents, were those which sustained the impeachment vote. Those wards which were largely populated by American born, or by

---

[41] Milwaukee *Sentinel*, February 22, 1895.

[42] See, for example, the editorial in the *Herold*, February 22, 1895, in which it noted: "The decision of the Common Council . . will be received by the great majority of the population with satisfaction It is the confirmation of many months' experience and the conviction that [Kempster] is not the right man to execute those measures necessary in the case of an epidemic . . . [He] is not master of the situation and could not awaken the general trust which is, after all, in such a case, a necessary prerequisite." I am grateful to Edith Hoshino Altbach for help in translating this editorial.

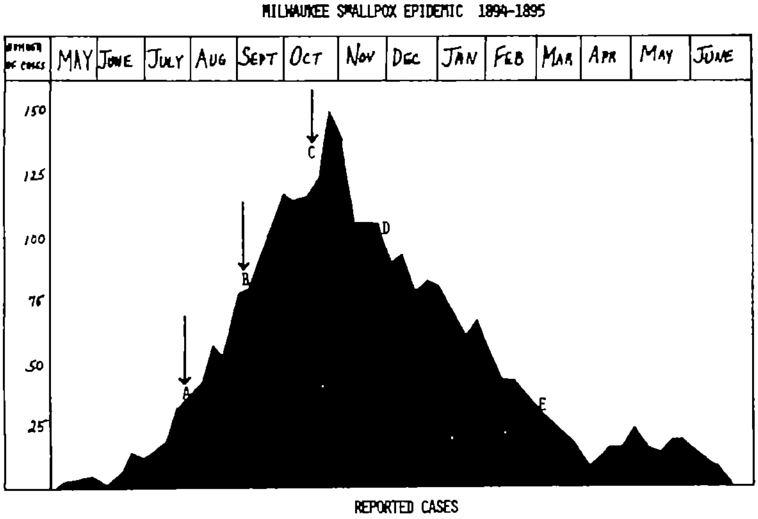

Fig. 4. Cases of smallpox, 1894-1895, and moves against Kempster.

A. August 6, 1894. Resolution on forcible removal.
B. September 4, 1894. Ordinance on forcible removal.
C. October 15, 1894. Resolution for impeachment investigation; revised ordinance on forcible removal.
D. November 26, 1894. Revised ordinance on forcible removal passed.
E. February 21, 1895. Common Council impeaches Health Commissioner.

immigrant groups other than German and Polish, voted for Kempster. Party affiliations did not determine the vote, since both Democrats and Republicans on the Council were split. Figure 3 illustrates the close correlation between German and Polish ethnicity and the vote against Kempster.[43]

The smallpox epidemic of 1894 severely divided the city of Milwaukee, causing political conflicts and resentments which were long lived. Most significantly for our interest, it had a retrogressive effect on public health in Milwaukee. Traditionally, epidemics were times when health authorities increased their powers. This had been true in Milwaukee and in other American cities. In 1894 in Milwaukee the opposite happened. During the height of the epidemic, with fear running high, the Council repealed those health measures which were seen as effective in halting the spread of the disease and fired the physician who supported those techniques. As figure 4 illustrates, the moves against Kempster were all initiated while the epidemic was still raging in the city. Within the space of the ten months from May 1894, when Dr. Kempster took office, to February 1895, when he was dismissed, the Common Council deprived the health department of some of the powers important for it to be effective, and ultimately deprived the Health Commissioner of his job. Kempster appealed the impeachment decision and was reinstated as Health Commissioner after one year. The episode, however, affected the health department permanently. It never regained powers lost during the tumultuous 1894 smallpox epidemic.[44]

---

[43] The sources of ethnicity were the *Eleventh United States Census*, 1890, and the 1895 *Wisconsin State Census*. Precise population figures by ethnic group were not available by ward.

Milwaukee's history with the disease illustrates the political nature of the issue of smallpox control. Slowly through the century the health department had gained confidence and control over the treatment of smallpox, until by 1894 it felt secure in its powers. But in that year, during a severe epidemic, the Common Council challenged and in part took away the most traditional of all health department functions—the ability to control epidemic diseases. Political issues, only some of which were directly related to smallpox, determined how the municipal government handled the medical emergency.

---

[44] See the *Sentinel*, January 18, 1896. For a copy of the judge's decision, see the *Eighteenth and Nineteenth Annual Report*, 1895, pp. 81-85.

THE MOVEMENT TOWARD A SAFE MATERNITY: PHYSICIAN ACCOUNTABILITY IN NEW YORK CITY, 1915-1940*

JOYCE ANTLER and DANIEL M. FOX

Until the 1940s, childbirth was, for most American women, a time of great danger and apprehension. Each year during the two decades after 1915, approximately 15,000 women perished from causes related to childbirth. Only tuberculosis accounted for more deaths among women in the childbearing years. The number of puerperal deaths, moreover, merely suggested the total loss of life in childbirth, for the deaths of many women with preexisting chronic conditions were frequently assigned not to puerperal causes but to the diseases that preceded their pregnancies. "As far as her chance of living through childbirth is concerned," wrote Dr. Josephine Baker, an authority in maternal and child health, the United States was near being "the most unsafe country in the world for the pregnant woman."[1] Many thousands of other women survived pregnancy with severe disability and lowered health status.

Although the issue of maternal mortality was the subject of many studies, conferences, and papers after 1915, it was not until the middle thirties, with the publication of a report on maternal mortality by the New York Academy of Medicine, that an effective strategy for its reduction came to be widely adopted. As we shall see, the startling facts produced by that report, together with the Academy's unusual tactic of seeking maximum publicity in the lay press for its findings, galvanized the medical profession into action, and led to widespread reform of obstetric practice in New York and other cities. The report has consequently been regarded as an important contributory factor in the marked decline of maternal mortality rates that occurred throughout the nation after 1935.

By the 1920s, the high rates of puerperal mortality in the United States attracted urgent attention. Because maternal death threatened family stability, it was seen as an even greater social loss than infant mortality, a problem to which health professionals had much earlier directed their attention. Saving mothers' lives, furthermore, was an issue which cut across the birth

---

* Presented to the 50th anniversary meeting of the American Association for the History of Medicine, Philadelphia, Pa., May 2, 1975.

[1] Josephine Baker, "Maternal mortality in the United States," *J.A.M.A.*, 1927, *89:* 2016

BULLETIN OF THE HISTORY OF MEDICINE 50 569-595 (1976)

Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

control controversy of the time, uniting conservative and liberal physicians and lay reformers. Safeguarding pregnancy rather than avoiding it became a central motive in the campaign to reduce the risks of childbirth.

While puerperal mortality rates in the United States remained stationary over a long period of time, mortality from most other diseases had shown marked decline. Spectacular improvements in medical science and technology, particularly in the field of prevention, occurred in the last decade of the nineteenth century and the first decades of the twentieth. From 1890 to 1915, deaths per hundred thousand in the U. S. Death Registration Area were reduced from 252 to 148.8 in tuberculosis, from 186.9 to 82.9 in pneumonia, from 97.8 to 15.7 in diphtheria and croup, and from 46.3 to 12.4 in typhoid fever.[2] The death rate from causes incidental to bearing children, however, showed no improvement. In 1890, the maternal death rate per hundred thousand population was 15.3; in 1915, it was 15.2, while a year later it had risen to 16.3.[3] In spite of the introduction of prenatal supervision, wider dissemination of aseptic technique, and the increasing incidence of hospitalization for delivery, little progress was made in reducing the maternal death rate after 1915. Maternal mortality in the U. S. Registration Area never went below 61 per 10,000 births, the 1915 figure, prior to 1936.[4] In contrast, after 1915 infant mortality from practically every cause was reduced by 40%, from 99.9 per 10,000 live births in 1915 to 60.1 in 1934.[5]

No matter what statistical procedure was used, the United States maintained a high rate in comparison with other nations. In 1930, it ranked last out of 25 nations, its rate more than double that of Sweden, Denmark, Finland, Holland, Italy, Japan and Uruguay.[6] Though mortality rates were not absolutely comparable among the various nations, studies showed that differences in statistical procedures or in methods of assigning causes to deaths did not explain the United States' exceedingly high rate.[7]

---

[2] Society of the Lying-In Hospital of the City of New York, *Maternity: An Educational Survey of a National Problem* (New York, 1923), 6.

[3] *Ibid.*

[4] The urban rate, moreover, was consistently higher than the rural, not being less than 64 since 1915, or less than 70 since 1917, with a peak of 96 in 1918 and a rate of 74 in 1932. For non-white women, maternal mortality in 1915 was 106. In 1932 it was 98, the only year in which the 1915 rate improved. Fred L. Adair, "Maternal, fetal and neonatal morbidity and mortality," *Am. J. Obst. & Gynec.*, 1935, *29*, 389.

[5] Robert M. Woodbury, "Infant mortality in the United States," *Ann. Am. Acad. Polit. & Soc. Sci.*, 1936, *188:* 96.

[6] In infant mortality, however, the U. S. ranked seventh, both in 1919–21, with a rate of 82.3, and in 1929–31, with rate of 64.6. Jacob Yerushalmy, "Infant and maternal mortality in the modern world," *Ann. Am. Acad. Polit. & Soc. Sci.*, 1945, *237:* 134–141.

[7] Elizabeth C. Tandy, *Comparability of Maternal Mortality Rates in the United States and Certain Foreign Countries*, U. S. Children's Bureau Pub. 229 (Washington: Government Printing Office, 1935).

The stable rates of puerperal mortality threatened medical self-esteem. Physicians acknowledged that approximately one-half to three-quarters of puerperal deaths were caused by infection, toxemia, and hemorrhage, diseases considered controllable through adequate supervision during pregnancy and appropriate technique in labor and delivery.[8]

The failure to reduce maternal mortality rates produced lively debates within the medical community. Indeed, the problem of maternal mortality was amongst the most controversial public health problems of the day, generating heated arguments concerning the nature and conduct of obstetrics. Yet, in spite of the recognition of the problem, no clear consensus on the reasons for the high death rates emerged. Speculations involved a wide range of causes, including: the lack of adequate prenatal care; pernicious midwifery; incompetence of general practitioners; poor obstetrical training of medical students and nurses; the low status and fee scale of obstetrics in contrast to general medicine and surgery; the expansion of indications for operative interference together with the more regular use of anesthesia; the absence of clinical material for training and lack of scientific interest in obstetrics, as well as its separation from gynecology; abortion and illegitimacy; falling birth rates; and finally, modern feminism, with its demand for technical-medical aids to achieve quick and painless labor.[9] Running through the debate was a fundamental question whose resolution would be decisive in shaping the future pattern of obstetric practice: Should childbirth be viewed mainly as a natural, physiological process, usually resulting in spontaneous delivery and which, under appropriate supervision, could be managed by nonphysician attendants? Or was the more useful perception that it was a dangerous, and sometimes pathological condition, frequently necessitating radical operative intervention, which required the attendance of skilled physician practitioners throughout?

---

[8] See, for example, White House Conference on Child Health and Protection, *Obstetric Education* (New York: The Century Co., 1932), 49.

[9] Significant works on maternal mortality during this period include: Grace L. Meigs, *Maternal Mortality—from All Conditions Connected with Childbirth in the United States and Certain Other Countries*, U. S. Children's Bureau Pub. 19 (Washington: Government Printing Office, 1917), George Clark Mosher, "Maternity morbidity and mortality in the United States," *Am. J. Obst. & Gynec.*, 1924, *7*· 294–298, discussion, 326–330; Austin Flint, "Responsibility of the medical profession in further reducing maternal mortality," *Am. J. Obs. & Gynec.*, 1925, *9:* 864–866; Susan Coffin et al., "Maternal mortality in Massachusetts," *J.A.M.A* , 1926, *86:* 408–413, Robert Morse Woodbury, *Maternal Mortality· The Risk of Death in Childbirth and from All Diseases Caused by Pregnancy and Confinement*, U. S. Children's Bureau Pub. 158 (Washington: Government Printing Office, 1926); Lee K. Frankel, "The present status of maternal and infant hygiene in the United States," *Am. J. Pub. Health*, 1927. *12:* 1209–1217, discussion, 1217–1220; Henry Jellett, *The Causes and Prevention of Maternal Mortality* (London: J. & A. Churchill, 1929), J V. De Porte, *Maternal Mortality and Stillbirths in New York State, 1915–1925* (Albany· New York State Department of Health, 1928); Matthias Nicoll, Jr., "Maternity as a public health problem," *Am. J. Pub. Health*, 1929, *19* 961–968, Louis I. Dublin, "Mortality among women from causes incidental to childbearing," *Am. J. Obst. & Dis. Women & Children*, 1918, *78*. 20–37; "The risks of childbirth," *Forum*, 1932, *87:* 250–284; White House Conference on Child Health and Protection, *Fetal, Newborn and Maternal Morbidity and Mortality* (New York: D. Appleton-Century Co., 1933); Edward S. Brackett, "Observations on the problem of maternal mortality," *New England J. Med.*, 1934, *210:* 845–51.

I

Medical interest in maternal health had been relatively slow to develop.[10] The prevention and control of illness and death of mothers and children was the most neglected of all public health services, Grace Abbott, director of the U. S. Children's Bureau, once commented.[11] Public responsibility for the securing of maternal and child health services in the U. S. lagged behind European initiatives. New York City in 1908 became the first governmental unit at any level to establish a division of child hygiene concerned solely with maternal and child health; ten years later, similar bureaus existed in only a handful of states.

The publication of mortality statistics by the U. S. Census Bureau in 1906 had first called attention to the prevailing high infant and maternal mortality. Over the next decade, health reformers interested in maternal and child welfare centered their efforts on the eradication of infant mortality. Services to childbearing mothers consisted primarily of limited, sporadic antepartum care for pregnant women, provided in an attempt to reduce the high infant death rate.

A 1917 report by Dr. Grace Meigs of the Children's Bureau, the first of its several studies of maternal mortality, was credited by several physicians with awakening the medical profession to an awareness of the severity of the problem of puerperal death.[12] The Meigs report characterized childbirth in the United States as suffering from an "unconscious neglect due to age-long ignorance and fatalism," and emphasized, assembling relevant statistics, that thousands of women died in childbirth from preventable causes.[13] The road to improvement, the report declared, was for women themselves to demand better care.

---

[10] On the development of maternal and child health services in the United States, see John Blake, *Origins of Maternal and Child Health Programs* (New Haven, Conn.: Department of Public Health, Yale University School of Medicine, 1953); and William M. Schmidt, "The development of health services for mothers and children in the United States," *Am. J. Pub. Health*, 1973, *63:* 419–427.

[11] Cited in George Clark Mosher, "The problem of mother and child," *Med. Woman's J.*, 1927, *34:* 217.

[12] See, for example, Robert de Normandie, "Medical men and maternal mortality," *Woman Citizen*, Dec. 1926, 20–22.

[13] Meigs, *Maternal Mortality*, 5.

The passage of the Maternity and Infancy Act of 1921 (Sheppard-Towner Act), which marked the definite recognition of maternal mortality as a public health problem, was largely the work of a national woman's lobby. The legislation, drawn up by the Children's Bureau as a direct response to conditions revealed in its study of infant and maternal deaths, provided federal grants to states for fostering health services to mothers and children. The organization of state maternal and child health units followed. Thousands of prenatal and infant care programs initiated under these state divisions were developed.[14] While the Sheppard-Towner Act had little effect on maternal mortality rates before it lapsed in 1929, it aroused great public interest in maternity, enabling many women to learn what to ask and expect of their physicians, and alerting the medical profession to their demands.

By the 1920s, largely because of the impetus provided by the Sheppard-Towner program, prenatal care had become the favorite strategy of health reformers (though not of the medical profession generally) interested in maternal welfare.[15] But a minority of obstetricians, including the influential George Kosmak, editor of the *American Journal of Obstetrics and Gynecology,* began to question commonly held assumptions about the effectiveness of prenatal care in reducing maternal mortality.[16] They believed that while antepartum care helped diminish such accidents of pregnancy as toxemia, the leading cause of puerperal death—infection—occurred during and shortly after labor, and was more closely related to obstetric practice at these times than to the care of the expectant mother.

The definition of good obstetrics was, however, in contention. For many years, the untrained, poorly regulated midwife had borne the brunt of complaints about the low level of American obstetrics. Midwives delivered a significant proportion of American babies in 1915, approximately 40% nationwide (30% in New York City). In 1930, the nation's 47,000 midwives were responsible for 15% of births, though in some states, primarily in the South, they delivered 40–50% of babies.[17] Though they were required to register with local health departments in the majority of states, only a few states required licensing as a prerequisite for registration, and even these had minimum educational qualifications for licensure. Many unlicensed, unregistered midwives practiced without supervision of any kind. Educational opportunities for midwives were almost totally lacking: in the United States, there were only two schools, one in New York and one in Philadelphia, that trained midwives.[18]

---

[14] For a representative description of maternity education programs established during the Sheppard-Towner period, see Florence McKay, "What New York State is doing to reduce maternal mortality," *Am. J Obst & Gynec.*, 1925, *9* 704–708. Also see J. Stanley Lemons, "The Sheppard-Towner Act. progressivism in the 1920's," *J. Am. Hist.*, 1969, *55:* 776–786.

[15] The importance of prenatal care as a factor in maternal health was established in a landmark study by John Whitridge Williams of Johns Hopkins in 1915 (J. Whitridge Williams, "The limitations and possibilities of prenatal care," *J.A.M.A.*, 1915, *64:* 95–101). Williams understood, as many of his contemporaries did not, the close connection between prenatal care and good obstetric care in hospital settings.

[16] Kosmak testified before the Committee on Interstate and Foreign Commerce of the 70th Congress that Sheppard-Towner activities concentrated unnecessarily on prenatal care. See Nicoll, "Maternity as a public health problem," 965 This view was confirmed some years later in a clinical study conducted at Yale University Medical School under the auspices of the American Public Health Association. The study concluded that "quality of delivery service is probably a greater factor than any other, including prenatal care, in the improvement of the outcome of maternity and the lessening of maternal mortality." See Margaret Tyler, J. H. Watkins, and H. H. Walker, *Report on the Evaluation of Prenatal Care* (New Haven: Institute of Human Relations, Yale University School of Medicine, 1934).

According to widely held medical opinion, the use of incompetent midwives by low-income families was responsible for the high rates of maternal mortality. By the 1920s, however, the declining number of midwives in large cities threatened the easy correlation of puerperal mortality with their attendance. Moreover, the lowest mortality rates were frequently found in cities with the highest percentage of births attended by midwives.[19] In states where childbirth was completely in physician hands, like New Hampshire, Vermont and Oregon, maternal death rates were as high as the national average.[20] Finally, maternal mortality was lower in all European countries (except Scotland) than in the U. S., although at least one-half and usually more than 80% of births in these nations were attended by midwives, as compared to only 15% in the U. S. (in 1930).[21]

Many medical observers considered the general practitioner the great danger in obstetrics.[22] According to this view, the GP took on obstetric work as a loss leader to acquire the medical practice of the patient's family, but gave it as little time and attention as possible because fees for obstetric cases were low. Hurried and under great pressure, the young practitioner would frequently resort to techniques he had little skill in performing in the interest of hastening labor. While it was usually agreed that general practitioners were suitable attendants for normal confinements, the absence of specified standards for obstetric specialization permitted them free access to more complicated cases of abnormal labor, despite their lack of training and experience. Furthermore, the GP's constant contact with infectious diseases treated in his routine practice increased the chances of puerperal sepsis. "Obstetrics," it was said, "is the general practitioner's specialty."[23]

---

[17] Palmer Findley, *The Story of Childbirth* (Garden City, N.Y.: Doubleday Doran, 1933), 127, and *Obstetric Education*, 204.

[18] Woodbury, *Maternal Mortality*, 78.

[19] Dr. Julius Levy of New Jersey's Bureau of Child Hygiene showed for example that, in 1921, four of the largest cities, Newark, New York, Baltimore and Cleveland, each with more than 25% of births attended by midwives, had lower rates of maternal mortality than Boston, with a highly organized medical system, a well-educated general public, and only 2.5% of births delivered by midwives. Julius Levy, "Maternal mortality and mortality in the first month of life in relation to attendant at birth," *Am. J. Pub. Health*, 1923, *13:* 89

[20] Baker, "Maternal mortality in the U. S.," 2017.

[21] *Obstetric Education*, 96. European midwives, however, particularly in the Scandinavian countries, received lengthy and intensive training in obstetrics.

[22] See, for example, comments by Drs. Davis, Speidel, Polak and Lanford, in Mosher, "Maternal morbidity and mortality," 295, 326; Dublin, "The risks of childbirth," 281; and Findley, *The Story of Childbirth*, 325.

Part of the problem lay in the low status accorded to obstetrics among medical specialties. Obstetrics was considered the least appreciated branch—the "Cinderella" or "stepdaughter"—of medicine. Practitioners did not receive as complete a training in obstetrics as they did in medicine and surgery. Medical students were given at least twice and often five times as many hours in general surgery as in obstetrics, although most general practitioners spent twice as much time in obstetric care as surgery. Because childbirth had historically been seen as a natural function, the public at large thought the obstetrician's accomplishments less than those of his surgical colleagues in gynecology. Since females originally practiced it, obstetrics was conceived of as "hardly a man's job," which could apparently be mastered by inspiration after the observation of a small number of cases.[24] Even the leading figure in early twentieth-century American obstetrics, J. Whitridge Williams of Johns Hopkins, annually apologized to medical students for the long association of his discipline with ignorant midwives.[25] That maternal mortality was lowest, however, in countries in which medical schools gave the longest and most complete undergraduate training in obstetrics did not fail to attract attention, and most reformers concluded that any improvement in obstetrics would have to follow curriculum revision directed toward securing more hours of obstetrical training.

The great increase in radical, or operative, obstetrics after 1915 appeared to be a primary cause of rising puerperal mortality, counterbalancing lives saved as the result of the introduction of asepsis and improved prenatal care. Forceps delivery, previously uncommon, was now practiced routinely for fetal as well as maternal indications. Caesarian sections, performed in the past only for definite indications like contracted pelvis and obstructed birth canal, had been extended to almost all complications of pregnancy and labor, including patient convenience. In many hospitals, one-quarter to one-half of all deliveries were performed by forceps, Caesarian sections, or version, a trend no doubt accelerated because surgical deliveries commanded fees twice those for spontaneous births. Economic factors also prevented the physician from spending time waiting for women to deliver spontaneously, another reason for the upsurge in surgical delivery. Experts believed, nevertheless, that 90–95% of all pregnancies were capable of being delivered by normal means. They pointed out that the lowest maternal death rates in the world were those of Holland, Sweden and Denmark where at least 95% of births were spontaneous.[26]

---

[23] George Gray Ward, "Our obstetric and gynecologic responsibilities," *J.A.M.A.*, 1926, *87:* 1.

[24] On the status of obstetrics, see B. P. Watson, "Can our methods of obstetric practice be improved?" *Bull. New York Acad. Med.*, 1930, *6:* 647–663; Mosher, "Maternal morbidity and mortality," 295–296; and Nicoll, "Maternity as a public health problem," 966.

[25] *Dr. Williams' Obstetrics, 1897–1898;* Rufus I. Cole Mss. (Health Sciences Library, State University of New York at Stony Brook).

The great increase in hospitalization of parturient women and the easy accessibility of anesthesia were cited as factors leading to increased, rather than decreased, maternal mortality, because they fostered surgical intervention. In the early 1930s, 56–85% of all live births in the ten largest U. S. cities took place in hospitals. Though hospitalization had advantages for the pregnant women, it exposed her to infections and led, said some observers, to the "often false feeling of security of the operating room" and thus to unnecessary and dangerous operations.[27] The popularity of in-hospital surgical interventions, moreover, influenced the training of interns, so that while artificial deliveries were stressed, the importance of the physiology of labor and of conservative obstetrics was ignored.

The departure from the traditional "watchful expectancy" of obstetrics in favor of routine surgical delivery was based on a conception of labor as "decidedly pathologic" and the idea that the modern woman, a "neurasthenic product of civilization," stood suffering with less fortitude than her forebears, demanding anesthesia and even Caesarian section to escape its dangers and pains. The patient herself was regarded as a cause for the high puerperal death rates almost as frequently as were midwives and GPs. Her self-indulgent demands for a quick and painless labor—a result, it was said, of modern life-styles, education, and magazine publicity—forced physicians against their will into a "reign of operative terror," where anesthesia inhibited the normal contractions of labor and made intervention imperative.[28] "American obstetrics," said one critic to a convention of the American Medical Association in 1936, "seems to be becoming a competitive practice to please American women in accordance with what they read in lay magazines."[29]

---

[26] See the report of E. D. Plass, "Forceps and Cesarean section," in *Fetal, Newborn, and Maternal Morbidity and Mortality*, 215–247. Also see J. Whitridge Williams, "A criticism of certain tendencies in American obstetrics," *New York State J. Med.*, 1922, *22:* 493–499; Rudolf W. Holmes, "The fads and fancies of obstetrics: a comment on the pseudoscientific trend of modern obstetrics," *Am. J Obst. & Gynec* , 1921, *2*. 225–237, and discussion, 297–397; Ward, "Our obstetric and gynecologic responsibilities," 1–3, Watson, "Can our methods of obstetric practice be improved?" 655; and Flint, "Responsibility of the medical profession on further reducing maternal mortality," 866.

[27] *Obstetric Education*, 18.

Although some women physicians supported the use of anesthesia to relieve childbirth suffering, they generally opposed routine surgical delivery. Many believed that the solution to the problem of maternal mortality lay in the assumption of obstetric practice by female doctors, who, they believed, were more sensitive to the needs of patients during childbirth, a position rigorously denied in the male-dominated discussion of maternal mortality. The superiority of female doctors in childbirth, they believed, was clearly indicated by the low maternal death rates of women's hospitals staffed by female physicians.[30]

Abortion and birth control, finally, were recognized as causes of increased maternal mortality. The desire to limit family size or to terminate growing numbers of unwanted out-of-wedlock pregnancies, some physicians claimed, resulted in large numbers of maternal deaths from intentional abortions, neutralizing gains made from improved obstetric practice.[31] Falling birth rates, furthermore, meant an increasing number of older primiparas who were less resistant to puerperal accidents, and hence, greater maternal mortality.[32] Birth control advocates, on the other hand, recognized that abortion deaths contributed to maternal mortality, but modified the argument. According to their view, the chief reason for the high death rates was the unwillingness of many women of impaired health or desperate economic circumstances to bear children, and their consequent resort to illegal abortion, frequently ending in death.[33]

---

[28] Examples of this attitude are found in Joseph de Lee, "Obstetrics vs. midwifery," *J.A.M.A.*, 1934, *103:* 308; Findley, *Story of Childbirth*, 53–54, 196–197; George Clark Mosher, "Ten years of painless childbirth," *Am. J. Obstet. & Gynec.*, 1932, *3:* 142–143. Also see the comments of Dr. Ray Lyman Wilbur, quoted in Helene Huntington Smith, "The case for anesthesia," *Delineator*, 1932, *125.* 50.

[29] The critic was Dr. Buford Garvin, cited in "Pains of childbirth," *Time*, May 25, 1936, 36.

[30] See, for example, the statement of Dr Bertha Van Hoosen, head of the Department of Obstetrics at Loyola University, quoted in Rosine Wistein, "Maternal mortality: a comparative study," *Med Women's J.*, 1932, *39:* 29, and "Maternal mortality" (editorial), *ibid.*, 66. On the low puerperal death rates of women's hospitals, see Maude Glasgow, *The Subjection of Woman and the Traditions of Men* (New York: Maude Glasgow, 1940), 232–233

[31] Adair, "Maternal, fetal, and neonatal morbidity and mortality," 387

[32] "Maternal mortality," *Med. Times & Long Island Med. J.*, May 1934, 157.

[33] Lydia Allen de Vilbiss, "A proposed method for reducing the maternal mortality rate," *Med. J. & Rec.*, 1930, *132.* 391–392; and Helen Miller, "Contraception as a means of conserving maternal health," *Birth Control Rev.*, 1929, *13:* 281–282.

II

New York City had long maintained a tradition of leadership in obstetrics and child welfare. The first effort to regulate midwife practice in the United States was undertaken in New York City in 1906; the following year, the first organized attempt to provide prenatal services to mothers began when the New York Association for Improving the Condition of the Poor engaged several nurses to visit mothers in tenement homes to instruct them in infant hygiene and "prevent infant deaths by caring for the mothers before the babies were born."[34] In 1908, the nation's first Bureau of Child Hygiene was established in the New York City Department of Health, and in 1911, the first school for midwives opened at Bellevue.

New York City had just begun to reorganize its system of maternal and obstetric care in 1915 following a study by a committee of New York physicians appointed by the then Health Commissioner, Dr. Haven Emerson, to analyze the conditions of childbirth in Manhattan, and their relation to the deaths of infants under one month of age. The committee, finding that many such deaths were caused by lack of prenatal care and poor care at the time of delivery, recommended that the city be divided into zones, in each of which would be established a maternity center where mothers could come for prenatal care. As a result of the study, the first maternity center in the United States was formed by the Women's City Club of New York in 1917, its work later taken over by the Maternity Center Association, founded the following year, which organized 30 prenatal clinics throughout the city. Later the Association discontinued sponsorship of the prenatal clinics in favor of complete and intensive care for all phases of the maternity cycle at one model center. More than any other single agency, the Maternity Center Association developed and demonstrated a model for a community maternity service, and through its institutes for public health nurses and other educational work, stimulated other communities to establish similar services.[35]

Despite its superior health services and record of accomplishment in obstetrics and child health, New York City's puerperal death rate in 1930 was barely a percentage point lower than the national average. While the city's infant mortality rate had declined from 85.4 deaths per 1,000 live births in 1920 to 50.9 in 1933, its rate of maternal mortality had in fact increased from 5.33 per 1,000 live births in 1921 to 5.98 in 1932. The Public Health Relations Committee of the New York Academy of Medicine had been aware of the city's high puerperal death rate since 1917, when at the urging of Dr. George Kosmak, a subcommittee was appointed to gather data on maternal mortality in New York. When this study, based on hospital questionnaires, as well as a successive study which utilized Health Department statistics, failed to produce accurate results, a new plan to study the public health problems of obstetrics in New York was suggested by Drs. Kosmak and Ralph W. Lobenstine at the request of the Public Health Relations Committee. The committee then appointed a Subcommittee on Maternal Mortality, consisting of Dr. Frederic E. Sondern, chairman, and Drs. Philip Van Ingen, Benjamin P. Watson, and Ransom S. Hooker. The subcommittee decided to undertake a survey based on a direct, personal inquiry of puerperal deaths, to begin January 1, 1930, and continue for three years, running concurrently with the deaths. An Obstetrical Advisory Committee, chaired by Dr. Watson, and with Kosmak, John O. Polak, and Harry Aranow as members, was appointed. Ransom Hooker was chosen director of the study. The work of gathering and tabulating the material was performed by two women physicians, Dr. Marynia Farnham and Dr. Elizabeth Arnstein, and several registered nurses. Dr. Farnham, along with Kosmak, wrote much of the final report. The New York Obstetrical Society provided an initial loan, and the Commonwealth Fund provided funds for the completion of the study.[36]

---

[34] Iago Galdston, *Maternal Deaths—the Ways to Prevention* (New York: The Commonwealth Fund, 1937), 7.

[35] Maternity Center Association, *Annual Report, April 1918–Dec. 31, 1921* (New York, 1921), 13, 20–21, 24; *Forty-Fifth Annual Report & Log 1915–1963 of the Maternity Center Association* (New York, 1964), *11:* 1–7.

Kosmak and Watson, both prominent New York obstetricians deeply concerned about the problem of maternal mortality, were active and influential members of the Obstetrical Advisory Committee. Kosmak was president, in 1930, of the New York Obstetrical Society, and in 1932, of the New York County Medical Society, and edited the *American Journal of Obstetrics and Gynecology*. His long-standing interest in the problem of maternal mortality was related to his vigorous, orthodox Catholic opposition to birth control and the belief that, to maintain the birth rate, pregnancy had to be made desirable through elimination of the fear of childbirth. A medical as well as social conservative, Kosmak questioned trends toward hospitalization of all confinements, routine surgical delivery and anesthesia, and the widespread promotion of prenatal care as the remedy for maternal mortality.

---

[36] New York Academy of Medicine, Committee on Public Health Relations, *Maternal Mortality in New York City: A Study of All Puerperal Deaths, 1930–1932* (New York: The Commonwealth Fund, 1933), ix–xii Dr. Polak died while the study was in progress, and was replaced by Dr. Charles A. Gordon

After a 1927 trip to Scandinavia, which impressed him with the excellent results obtained from carefully supervised midwife practice, he retreated from his former antipathy to midwifery, and began to consider the trained midwife as a possible participant in a reformed system of obstetric care.[37]

Watson, professor of obstetrics and gynecology at Columbia University, had trained in Scotland, taught and practiced in Canada, and participated in a survey of maternal mortality in Scotland in 1925. His account of an outbreak of puerperal infection at Sloane Hospital in 1927 received national publicity, although it discomforted many in the profession. Like Kosmak, he espoused a conservative obstetrics, questioning the routine hospitalization of obstetric patients. However, he was more definitive in recommending a system of trained nurse-midwives as part of a professional hospital team to handle normal deliveries, a decidedly minority opinion in the medical profession.[38] A third member of the Advisory Committee, John O. Polak of the Long Island College Hospital, was an exponent of the value of home deliveries.

The methodology employed in the New York investigation was adopted from a Children's Bureau Study of maternal mortality in 15 states in 1927–28 (published in 1933), the first thorough clinical study of large numbers of maternal deaths, and involved an analysis of individual case records supplemented by a personal interview with the attending physician. Each week during the period of the survey, the New York City Health Department forwarded to investigators copies of all death certificates which named a puerperal condition as primary or contributory, or which stated the existence of pregnancy. Within one month of each death, while circumstances were fresh in the minds of attendants, interviews were conducted with everyone who attended the patient at any time during pregnancy, delivery, or the puerperium. Investigators had access to all written hospital records.

The Obstetric Advisory Committee, in consultation with investigators, then examined each case to determine the true cause of death and whether the death was preventable, using as the criterion for an avoidable death whether the "best possible skill in diagnosis and treatment which the community could make available" had been applied. Responsibility for a preventable death was assigned either to the attendant—physician or midwife—or to the patient herself. If every possible precaution had been taken by the patient and attendant, and if the delivery had been properly carried out, the death was considered non-preventable. Accounts of the quality of care were correlated to the patient's economic status, which was determined from housing data; and information on hospital procedures, standards and personnel was gathered by questionnaire.[39]

---

[37] George W Kosmak, "Sensible standards for proper obstetric care," *J. Med. Assoc. New Jersey*, 1930, *27:* 331–335; "Results of supervised midwife practice in certain European countries," *J.A.M.A.*, 1927, *89:* 2009–2012; "Community responsibilities for safeguarding motherhood," *Pub. Health & Nursing*, 1932, *26:* 292-299; B. P. Watson, "In memoriam. George William Kosmak," *Trans Am. Gynec. Soc* , 1955, *78.* 233-234; and Howard C. Taylor, Jr., "Memorial for Dr. George W. Kosmak," New York Obstetrical Society MSS (New York Academy of Medicine). Collection hereafter referred to as NYOS MSS.

[38] Watson, "Can our method of obstetric practice be improved?" 656–663.

The benefit of clinical methodology was demonstrated by the finding that the usual reporting methods which relied on vital statistics routinely filed with departments of health resulted in a high margin of error, 17.8%. In the case of abortion, the disparity between the actual and reported cause of death was 34.7%, and for septicemia, 29.2%.[40]

The outstanding finding of the study was that in the total series (2,041 deaths) nearly 2/3 (65.8%) of all deaths were judged to be preventable had the patient received proper care. By cause, 77.1% of deaths from induced abortions, 75.1% of deaths from septicemia, 76.1% of deaths from hemorrhage, and 87.1% of deaths following accidents of labor were considered avoidable. For all the preventable deaths, responsibility lay with the physician in 61.1% of cases, with the patient in 36.7%, and with midwives in only 2.2%. Following operative delivery, 76.8% of deaths were considered avoidable, a higher percentage than in the total series, with responsibility assigned to the physicians 86.8% of the time. Physician responsibility for preventable deaths was divided almost equally between faults of technique, 50.9%, and errors of judgment, 49.1%, suggesting a "surprisingly high degree of actual technical incompetence" and "a lack of respect for operative undertakings."[41]

By cause, the largest proportion of deaths (25.0%) was due to septicemia; next in importance were deaths from abortion (17.5%).[42] Almost half the deaths in the entire series (45%) had followed operative delivery. The mortality rate for operative delivery was found to be five times that for spontaneous delivery (10.5 to 2.0). Caesarian sections, although they represented only 2.2% of total deliveries in the series, constituted a remarkable 19.8% of total deaths (excluding deaths from abortions and extrauterine pregnancies).[43] Anesthesia was the direct cause of death in 20 cases, but was administered to 87.7% of patients whose death was attributed to operative shock. (Noting the close association between anesthesia and operative delivery, the report warned against the casual use of anesthesia for the "mere alleviation or the entire elimination of pain.")[44]

---

[39] On methodology, see NYAM, *Maternal Mortality in New York City* (n 36 above), 11–13.

[40] *Ibid.*, 17.

[41] *Ibid.*, 32–38.

[42] *Ibid.*, 54, and Ransom S. Hooker, "Maternal mortality in New York," *The Health Examiner*, 1933, *3* 13

[43] NYAM, *Maternal Mortality in New York City*, 126, 130, 137.

For hospital deliveries, the death rate was more than two times that for deliveries in homes (4.5 to 1.9), where about 30% of all births took place, leading the Committee to suggest a re-examination of attitudes toward home confinement.[45] There was no difference in the result of home deliveries by physicians or by midwives, even though only 1/3 of the midwives interviewed were found to be truly competent. The death rate for deliveries by midwives who had contact with 5.4% of patients in the series was, at 1.6 per 1,000 live births, 64% lower than the general series rate of 4.5 per 1,000 live births.[46]

Data on hospital practice throughout the city, collected by questionnaire, showed that the proportion of preventable deaths was significantly lower in municipal (34.2%) than in either voluntary (49.1%) or obstetric (51.4%) hospitals, a finding the Committee attributed to the fact that the percentage of Caesarian sections performed in municipal hospitals was less than one-half that in obstetric hospitals and little more than one-half that for voluntary hospitals. The report concluded that no adequate control of voluntary or proprietary hospitals was maintained in the city.[47]

Finally, the risk of death in pregnancy was found to be highly correlated with economic status, race, and nativity. The highest puerperal death rate was found among the least-favored group, the lowest among the most privileged, although the white-collar class showed a higher rate than the less well-off artisan group, which relied on free care provided by municipal and voluntary hospitals.[48] For Negro women and foreign-born women, the data, however disturbing, followed customary curves: the death rate for black women was twice as great as for white women; the rate for foreign-born women from all puerperal causes greatly exceeded that for native-born women.[49]

From these statistical findings, the Committee concluded that the death rate of women in childbirth in New York was unnecessarily high because of the following reasons: 1. *Inadequate and improper prenatal care.* In almost

---

[44] *Ibid.*, 115–116

[45] *Ibid.*, 139–140.

[46] *Ibid.*, 195–198.

[47] *Ibid.*, 181–182.

[48] *Ibid.*, 151–152

[49] *Ibid*, 163–167. Caesarian section as a cause of death, however, was more frequent among white women (20.5%), than Negro women (14.7%). *Ibid.*, 131.

60% of the cases examined, the patient failed to seek prenatal care, and where it was sought, the attendant frequently failed to provide it. 2. *High incidence of operative interference during labor.* Frequently operations were performed for the wrong indications, at improper times, and without an appropriately trained attendant. 3. *The attendants' incapacity in judgment or skill.* Here, errors included the failure to provide proper prenatal care, frequently incorrect prognosis and improper conduct of delivery, the lack of consultation, and the failure to maintain proper asepsis. 4. *Inadequate hospital standards.* These included improper physical equipment; lack of appropriate labor and delivery facilities; failure to carry out isolation; use of operating rooms as delivery rooms; the performance of major operative procedures by unsupervised residents or junior members of attending staffs without consultation with chiefs; the failure of many proprietary hospitals to exercise staff supervision. 5. *Midwife incompetence.* The training of midwives, many of them elderly, illiterate, foreign-born women, was frequently insufficient, and there was no attempt to evaluate qualifications for licensure.[50]

The Committee's recommendations for changes in methods of obstetric practice included: education for the public as to the necessity of prenatal care, the dangers of operative delivery, and the relative safety of home delivery, with the more active participation by physician organizations in lay education through press, radio, and publications; improved training of medical students, including prolonged graduate study for specialization, and of hospital internes; the confinement of nonspecialist practitioners to normal cases, requiring frequent and early consultations with highly trained specialists; improved hospital facilities and supervision of staff, including stricter control of proprietary hospitals, the appointment of qualified obstetricians as staff directors, the maintenance of separate obstetric delivery rooms, the observation of rules for asepsis, especially masking, and stringent isolation; and finally, improved training and supervision of better qualified midwives.[51]

While the Committee had found many midwives poorly trained, it concluded that, since the results of their practice were as good as those obtained by physicians under comparable circumstances, the midwife was an "acceptable attendant for properly selected cases of labor and delivery" and should have a position in any scheme for providing for maternity care. "In face of the pressing problem of assuring proper care for all women at an outlay that is not prohibitive," it reported, "she has proven her value." The medical profession must accept the midwife as "one of its adjuncts," an "ally" in reducting childbirth morbidity and mortality. "There must be a readiness to cooperate with her."[52]

---

[50] *Ibid.*, 213–216

[51] *Ibid.*, 216–221

The report left no doubt as to the major source of the high puerperal death rate:

> Sixty percent of all deaths which could have been avoided have been brought about by some incapacity in the attendant. . . . Most are plainly the results of incompetence. Prevention in this field will mean increasing the respect of the physician for the gravity of obstetrical operations and educating him to a greater caution in attacking problems which are properly the field only of the highly trained obstetrician. . . .
>
> The hazards of childbirth in New York City are greater than they need be. Responsibility for reducing them rests with the medical profession.[53]

Despite its greater detail and more elaborate methodology, the conclusions of the New York study were similar to those of recent surveys elsewhere in the United States and abroad. Studies of maternal deaths in Britain and Scotland, a study of puerperal mortality in Massachusetts and one in Cleveland, the 15-state Children's Bureau study, and reports presented to the White House Conference on Child Health and Protection called by President Hoover pointed to the conclusion that maternal mortality was preventable, and was related to such factors as lack of prenatal care, operative interference by incompetent attendants, inadequate and improperly supervised institutional facilities, poorly trained, unregulated midwives, as well as contributing negligence of patients and their families.[54] The remedies, too, were similar: education, standards, and obstetrical restraint. What distinguished the Academy report from other studies were: a precise and detailed clinical methodology which provided indisputable evidence about preventability; the undisguised attribution of blame for preventable deaths to the medical profession; and an acceptance of trained midwives and home delivery in normal obstetrical cases, contrary to general medical opinion. Most important, the Academy deliberately and effectively publicized its findings through an unusual media release that was designed to attract attention and precipitate controversy within the medical profession.

The report received wide medical and lay attention. Before the report, published by the Commonwealth Fund in November 1933, was reviewed in any medical journal, the Medical Information Bureau of the Academy released to the lay press a carefully worded summary of it entitled, *Why Women Die in Childbirth.*[55] The findings, especially the responsibility assigned to physicians for many preventable deaths, were given prominent attention in more than 300 newspapers in 30 states. "When a doctor attacks another doctor," the *Nation* editorialized, "it is time for the general public to take notice."[56]

---

[52] *Ibid* , 209–212.

[53] *Ibid.*, 49, 222.

[54] See U. S. Department of Labor, Children's Bureau Pub 223, *Maternal Mortality in Fifteen States* (Washington: Government Printing Office, 1934); Robert Bolt, "Maternal mortality study for Cleveland, Ohio," *Am J Obst. & Gynec.*, 1934, *27*. 309–313; J. Parlane Kinloch, *Maternal Mortality· Report on Maternal Mortality in Aberdeen, 1918–1927* (Edinburgh. Scottish Board of Health, 1923); as well as studies by Coffin et al and the White House Conference on Child Health and Protection Also see James Young, "Maternal mortality studies," *Am. J. Obst. & Gynec* , 1936, *31*· 198–212.

Despite the Committee's matter-of-fact approach, the assignment of responsibility to the medical community was controversial. The New York Obstetrical Society, an original sponsor of the study, filed a formal complaint with the Academy, whose Council had approved the committee report by a unanimous vote, protesting this publicity.[57] The medical societies of Queens, Bronx and Albany countries also protested the method of publicity.[58] Many physicians, as was customary when the profession was embarrassed, suggested sinister motives.

A subcommittee of the Academy's Public Health Relations Committee, composed of two former Academy presidents, Dr. S. W. Lambert and Dr. J. S. Hartwell, was appointed to report on the press release and the Obstetrical Society's protest against it. The committee concluded that the abstract had been released by the Medical Information Bureau in accordance with Academy bylaws, and that much criticism of the method of publicity arose from the decision to postpone reviewing the report in the medical press until after publication of the book and lay articles about it. It found that the release did provide an accurate summary of the Report's findings, and that its much-criticized caption, *Why Women Die in Childbirth,* described the study appropriately. The committee defended the deliberate publicity, concluding that the saving of even one mother's life was more important than medical prestige. Unfavorable criticism arose, the Academy spokesmen declared, from the "startling nature of the facts" themselves, which provoked fear that the revelations would do harm to physicians. Minimizing the seriousness of the situation would, they countered, open the profession to the charge of shielding itself from attack.[59]

---

[55] NYAM, Medical Information Bureau, "Why women die in childbirth," Nov. 20, 1933.

[56] "Hazards of childbirth," *Nation,* 1933, *137:* 612.

[57] Draft of letter from New York Obstetrical Society to Dr. Bernard Sachs, president, NYAM, Dec. 4, 1933, NYOS MSS.

[58] Philip Van Ingen, *The New York Academy of Medicine* (New York: Columbia University Press, 1949), 445.

[59] *Report of Subcommittee on Publicity of Maternal Mortality Report* (New York. NYAM, Public Health Relations Committee, 1934).

The Obstetrical Society counterattacked, appointing its own committee to report on the Academy abstract. While the target ostensibly was the manner of publicity, in fact the Society committee attacked the major interpretations of the report itself. It argued, first, that preventability was an imprecise concept (the obstetricians preferred the term "controllable"), which might result in unfair lawsuits for malpractice. Secondly, it argued that the report distorted the facts in assigning midwives only 2.2% of preventable deaths since midwives attended a small proportion of deliveries out of the total series. (The true percentage of preventable mortality, it suggested, was 75% in midwife-attended cases compared to 68% for the physician group.) Licensing any additional midwives was opposed for as long as the midwife was permitted to practice, "obstetrics will never be elevated to the position it rightly deserves." Home delivery, furthermore, was not safer than delivery in well-organized hospitals. Surgical interventions then performed under proper indications by skilled personnel were "merciful" and "life-saving." Caesarian section was one of the "greatest blessings" to modern women. Proper administration of anesthesia was "essential," "valuable," and "humane."[60]

At its April meeting, the Obstetrical Society endorsed the Committee's report, and authorized its immediate release to the lay press in an abstract titled *How Childbirth May Be Made Safe*.[61] Dr. Benjamin Watson, chairman of the Obstetrical Advisory Committee to the Academy study, promptly resigned his office as First Vice-President of the Obstetrical Society in protest.[62] Kosmak also resigned from the Society's Council, and refused to publish either the Society's transactions concerning the Academy study, or its abstract in the *American Journal of Obstetrics and Gynecology*. The issue was purely a local one, he wrote the Society's secretary, for which there would be no national audience.[63]

The Academy strategy of maximum publicity achieved the intended political effect. Medical associations in cooperation with the Health Department acted with unaccustomed speed to eliminate obstetric mismanagement and carry out the recommendations of the report. The New York Obstetrical Society offered the services of its newly formed Maternal Advisory Committee to the city Health Commissioner, and most of the county medical societies appointed their own subcommittees on maternal welfare.[64] An Advisory Obstetric Council to the Departments of Health and Hospitals, with Kosmak as general secretary, was appointed to make a citywide survey of obstetric facilities, methods and personnel, and submit recommendations. As a consultant to the Bureau of Child Hygiene, Kosmak also assisted in the development of a prenatal program for the city.[65] By 1938, Dr. Watson, who had resigned as vice-president of the Obstetrical Society during the controversy, became its president.

---

[60] *Report of the New York Obstetrical Society to Review the Maternal Mortality Report of the Public Health Relations Committee of the New York Academy of Medicine* (New York: NYOS, 1934).

[61] *How Childbirth May Be Made Safe* (New York: NYOS, 1934).

[62] Benjamin P. Watson, Sect. New York Obstetrical Society to Hervey Williamson, April 11, 1934, NYOS MSS.

[63] George W. Kosmak to Hervey Williamson, April 12, 1934, and June 15, 1934, NYOS MSS.

Several months after the report was published, Kosmak presented the political analysis which justified the deliberate publicity to a meeting of the Obstetrical Society itself.[66] The failures revealed by the study, "were the shortcomings of medical men" which could be corrected only by the profession. The report did not threaten the 70 obstetric specialists who were Society members, but rather, the 4,000 practitioners of medicine in New York who necessarily performed the bulk of its obstetrics. The most important task in correcting the situation was to restrict the GP. The Society should therefore present a united front in support of the Academy report, and not allow its criticisms of it to be used by GPs against it. As for the midwife, "like it or not" she was "an institution and we simply must make the best of it and must provide for improvement" until a substitute could be found. Trained midwives, Kosmak asserted, were superior in skills and ability to the student nurses to whom hurried doctors regularly entrusted the care of their hospitalized maternity patients.

Some weeks later, Kosmak addressed a special meeting called by the New York Academy of Medicine to discuss "the constructive aspects" of its report.[67] He spoke of the problem of the general practitioner and of the poorly supervised interne and junior staff member, who, because of the absence of standards, "could do things in obstetrics which he would not be tempted to do in other fields of medicine." Kosmak admitted that the imposition of restraints through "self-imposed regulations" of medical agencies might be interpreted as "interference with the legal rights of a licensed physician" but he believed such action would do much to re-establish public confidence and "thus react favorably rather than otherwise" on medical practice.

---

[64] Hervey Williamson to John L. Rice, N Y.C. Commissioner of Health, March 14, 1934, NYOS MSS

[65] John L. Rice, *Guarding the Health of the People of New York City, Preliminary Reports for 1934–1936* (New York: N.Y.C. Department of Health, 1936), 36; *50 Years of Better Health for New York's Mothers and Babies, 1908–1958* (New York N.Y.C. Department of Health, 1958), 16.

[66] NYOS, *Transactions of Proceedings*, Feb. 133, 1934, 41–45, NYOS MSS.

[67] *Constructive Aspects of the Maternal Mortality Report of the New York Academy of Medicine* (New York: NYAM, 1934), 1–9

Kosmak endeavored to enlist wide community and lay support of mortality review in the belief that the securing of a safe motherhood was a collective responsibility to be carried out at the local level. The strategy of maximum exposure undertaken by the Academy to publicize its report reflected this view. Physicians were to provide leadership through the establishment of committees to survey and evaluate local data, Kosmak explained, but a wide segment of the community—nurses' groups, women's clubs, and allied professions and agencies—had to be actively engaged in order to act upon the data. Only through intense community involvement ("community control," as Kosmak phrased it) could the tide of maternal mortality be reversed and an "obstetric conscience" created. Self-regulation at the local level, furthermore, could prevent the introduction of some degree of federal control of medical practice, a possibility which Kosmak, a staunch opponent of state intervention in medicine, greatly feared.[68]

The methods expounded by Kosmak produced successful results in a short period of time. Maternal mortality in New York City declined by 45% in the five years following publication of the report.[69] While several factors may have contributed to the reduction, New York City's positive experience helped establish mortality review as an important preventive tool in curbing puerperal death.

III

The analysis of maternal deaths proceeded in several other cities, where, as in New York, initial studies led to the establishment of permanent committees mandated to conduct continuous reviews of obstetric practice. The results of the New York study were publicized extensively by agencies like the Maternity Center Association of New York. Many cities and counties began to study their maternal deaths and to formulate inclusive plans for the care of mothers and babies. Along with the New York model, Philadelphia's maternal mortality committee became a prototype for a mortality review mechanism widely adopted across the country. In 1930, the Philadelphia County Medical Society appointed a maternal welfare committee, under the chairmanship of Dr. Philip Williams, to investigate obstetric conditions in the city. Patterning its three-year survey directly after the New York Academy study in an attempt to determine causes of death, whether preventable, and where responsibility lay, its conclusion—that the major blame for the city's high death rate rested primarily with the medical profession, with midwives a negligible factor—repeated the New York findings.[70]

---

[68] Kosmak, "Community responsibilities for safeguarding motherhood," 292–299, and "Editorial comment: the trend of modern obstetrics," *Am J Obst. & Gynec.*, 1938, *36.* 315.

[69] See Alfred Hellman, "Better obstetrics and the Subcommittee on Maternal Welfare," *New York Med. Week*, July 22, 1939, *18:* 4; and Benjamin P Watson, "Problems of maternity," in James Alexander Miller et al. (eds), *Preventive Medicine in Modern Practice* (New York: P. B. Hoeber, 1942), 176.

After the completion of the study, the Philadelphia committee decided to continue its analysis of maternal deaths through a cooperative program developed between hospital obstetric staffs and the County Medical Society. The committee expanded its membership to include representatives from maternity departments of all Philadelphia hospitals as well as internes, residents, social workers, and other interested parties. Under Dr. Williams' guidance, and without fear of malpractice suits, maternal deaths were carefully analyzed in an "open monthly forum" to assess responsibility for blame.

The monthly seminars revealed the practice of "much bad obstetrics," according to Dr. Williams, and corrective measures, particularly to prevent unnecessary obstetric surgery by unqualified staff, were taken. Hospitals accepted new rules specifying obligatory consultations before Caesarian section as well as techniques in labor, delivery room and nursery, and redefined staff privileges.[71]

As a result of the monthly review meetings, an "obstetric conscience" was created in Philadelphia. An excellent description of how the committee achieved this result was provided by Dr. Thaddeus Montgomery, a participant in the Philadelphia committee. "At first," he wrote,

> no very noticeable effect upon maternal mortality was observed, but as the years passed and the activities of the Committee became more widely recognized, a subtle change of attitude took place. Hospital staffs became zealous in the analysis of their own obstetric fatalities. . . . The occurrence of a maternal death became a calamity to be carefully studied by the institution in which it occurred. . . . Gradually physicians

---

[70] One difference between the New York and Philadelphia reports lay in the definition of preventable deaths. A death was preventable according to the New York definition, if the "best" possible skill of the community had been available, while preventability, to the Philadelphians, referred to a "reasonable" degree of physician skill The Philadelphia study summarized four major causes of maternal mortality: self-induced, criminal abortions; errors of judgement on the part of the medical profession; lack of appreciation of the need of prenatal care by lay people; and failure of hospitals, organized medicine, and allied agencies to grasp their responsibilities Abortions, with resulting septicemia, were the largest single cause of puerperal death in Philadelphia. In its report, the committee spoke of the "overwhelming" evidence of the advisability of abortion legalization, based on the example of the Soviet experience, and called for an impartial analysis to be made of the question. Philadelphia County Medical Society, *Maternal Mortality in Philadelphia, 1931–1933* (Philadelphia, 1934), 127–133, Philip Williams, "The preventive aspects of maternal mortality," *J. Michigan State Med. Soc.*, 1943, *42*: 25–26.

[71] Philip Williams, "Graduate education in obstetrics," *Am. J. Obst. & Gynec.*, 1942, *43*: 529; and P. Williams, "The responsibility of the hospital obstetric staff conference in maternal welfare," *Med Ann. District of Columbia*, 1947, ‡. 298.

> began to feel that in the conduct of obstetric delivery they were not free agents to act as they would, but that the medical opinion of the city was looking over their shoulders to see that they gave to each patient the best that modern obstetric practice had to offer. Consultation in different situations was expected, and "acrobatic" obstetrics became taboo—no longer to be tolerated.[72]

The work of this committee resulted in a dramatic decline in maternal deaths, a result which Williams believed preceded improvement caused by the widespread use of antibiotics, sulfa drugs, and blood banks. From 1931 to 1940, the rate of maternal mortality in Philadelphia dropped by almost 2/3 (from 68 per 10,000 live births to 23).[73] So highly successful was its work, in fact, that the Obstetrical Society established similar mortality review committees to investigate problems of stillbirths, fetal deaths, and premature births, where further problems of obstetric mismanagement had been revealed. Similar gains took place in other large cities, and in fact, throughout the United States as a whole, although it seemed that the rate of maternal mortality decreased more quickly and substantially in states like New York, Pennsylvania, Connecticut, Rhode Island and New Jersey, where cooperation and self-criticism reached its peak.

By the end of the thirties, many more maternal mortality review committees had been formed by state and county medical societies in cooperation with hospitals and health departments. Their establishment stimulated healthy rivalry among communities jealous of their progress in the field, each vying with the others to show lower mortality figures from year to year. Following the procedure developed in New York and Philadelphia, each maternal death was carefully studied and analyzed, in open meetings, to determine how the death might have been prevented and who was at fault. The process deterred unnecessary and dangerous procedures by unqualified attendants, and by case discussion reinforced the need for expert obstetric consultation when problems arose. Descendants of these committees, in most states and many local areas, are today major participants in peer review in cases of maternal mortality and morbidity.[74]

IV

The establishment of maternal mortality review committees was one aspect of a vast expansion in maternal welfare work that took place in the

---

[72] Thaddeus L. Montgomery, "The maternal welfare program in Philadelphia," *Proceedings of the First American Congress on Obstetrics and Gynecology, 1938,* 542.

[73] "After office hours: a visit with Dr Philip F. Williams," *Obst. & Gynec* , 1956.– 121–122; and Williams, "The preventive aspects of maternal mortality," 30.

[74] Jose G. Marmol, Alan L. Scriggins, and Rudolph F. Wollman, "After office hours. history of the maternal mortality study committees in the United States," *Obst. & Gynec.*, 1969, *34:* 126

1930s. By the end of the decade, many communities had active maternal welfare agencies engaged in a wide variety of educational, preventive, and regulatory work, including mortality review. Many experts correlated the rapid reduction of maternal mortality after 1935 with these activities.[75] Our data suggests, however, that cause and effect are more complicated.

After remaining stationary for so many decades, the puerperal death rate had begun to fall in the early thirties, though rather slowly. After 1936, the decline accelerated. From 1930 to 1936, the United States maternal mortality rate fell 15% (from 6.7 to 5.7/1,000 live births), or approximately 3% a year. In the years 1936–38, the rates fell 12% annually (from 5.7 to 4.2). The comparative rate of decrease was 14% in the years 1930–35, 35% in 1935–40, and in the 1940s, 74%.[76]

During the decade after 1933, when the New York Academy's report was published, the maternal death rate in the United States declined by 60%, almost double the rate of reduction for infant mortality, which decreased 31%.[77] The decline in maternal mortality rates, moreover, was not paralleled by decreases in rates of other important causes of death. By 1949, the maternal mortality rate for the entire United States was less than one maternal death per 1,000 live births, comparing favorably with the lowest rates obtainable abroad. The change had occurred in every part of the country—in 1949, even the highest state rate (2.4) was about 1/2 the lowest rate in 1933 (4.3/1,000 live births)—and had affected rates from every cause of puerperal mortality.[78] Maternity mortality was no longer a serious nationwide problem, even if rates remained relatively high in particular areas.

Although the decline in maternal mortality rates in the 1930s appears to have been most dramatic in places like New York and Philadelphia where the greatest medical and civic activity to control obstetric practice occurred, the reduction in maternal mortality in the United States was so widespread that it cannot be comfortably accounted for by increased maternal welfare services and improved obstetric care alone. Moreover, maternal mortality rates fell sharply in the same period of time throughout the world. Beginning about 1936, maternal mortality dropped sharply in the United States, Switzerland, the Union of South Africa, Mexico, Scotland, New Zealand, the Irish Free State, Australia, Canada, England, and Wales. Within seven to eight years, the rate had been reduced by half in many of these nations.[79]

---

[75] See, for example, James Knight Quigley, "Maternal welfare, what are its fruits?" *Am. J. Obst. & Gynec.*, 1940, *39* 349–353; Williams, "The preventive aspects of maternal mortality," 25; and Watson, "Problems of maternity "

[76] Quigley, "Maternal welfare, what are its fruits?" 351; Sam Shapiro, Edward R Schlesinger, and Robert E. L. Nesbitt, *Infant, Perinatal, Maternal and Childhood Mortality in the United States* (Cambridge: Harvard University Press, 1968), 145–146

[77] Marjorie Gooch, "Ten years of progress in reducing maternal and infant mortality," *The Child*, 1945, *10:* 77–81

[78] Frank G Dickinson and Everett L Welker, "Maternal mortality in the United States in 1949," *J.A.M.A.*, 1950, *144*· 1395–1400.

There is at present no satisfactory explanation for the change occurring with such apparent uniformity among countries so obviously disparate, and with such varying levels of medical care and services.[80] For the United States, several contributory causes can be suggested.

Advances in medical knowledge and techniques were of major importance, particularly the development and use, after 1933, of antibiotics, sulfonamides, and blood and blood substitutes. The beginning of the sharpest declines in maternal mortality rates coincided with the wider adoption of these measures, although rates had started to fall even earlier. Furthermore, the reduction in puerperal mortality was not limited to deaths due to infection and to hemorrhage, shock, and trauma, those causes most affected by use of the new drugs and blood substitutes.

Better training and the institutionalization of obstetrics as a specialty improved obstetric practice. Beginning in 1930, when the American Board of Obstetrics and Gynecology was established, there was a considerable expansion of educational and training programs in obstetrics for general practitioners and explicit standards for certification of specialists. Other notable educational efforts were those of the American Committee on Maternal Welfare, and in midwifery, the Maternity Center Association of New York, and the Frontier Nursing Service in Kentucky.

Improved hospital facilities for obstetric care governed by published and increasingly well-enforced standards and an expansion of prenatal services reduced the risks of puerperal death. Minimum standards established by the American College of Surgeons and by the American Hospital Association helped promote better hospital regulations for asepsis, stricter supervision of house staff, and the isolation of obstetric departments. Hospitalization for confinement increased more than 100% in the ten years after 1933 (from approximately 35% to 72% of all births), and for the first time was not associated with higher rates of puerperal death. Expansion of prenatal care facilities, aided by funds provided in the Social Security Act of 1936, helped create improved antepartum services throughout the country.

---

[79] Yerushalmy, "Infant and maternal mortality in the modern world," 139.

[80] Reasons for the decline in maternal mortality after 1933 are suggested in Quigley, "Maternal welfare, what are its fruits?" 350; Gooch, "Ten years of progress in reducing maternal and infant mortality," 80; Dickinson and Welker, "Maternal mortality," 1398; Shapiro et al., *Infant, Perinatal, Maternal and Childhood Mortality in the U. S.*, 145–146; and in Nicholas Eastman and Louis M. Hellman, *Williams' Obstetrics*, 13th ed. (New York: Appleton-Century Crofts, 1966), 8–9.

Increased public awareness of pregnancy and childbirth also helped foster a safer maternity. During the 1930s, long-standing taboos against public discussion of pregnancy and childbirth were broken. The Maternity Center Association's national campaign of public information played a crucial role in this development: it conducted institutes for 15,000 public health nurses throughout the United States on pregnancy and childbirth, and sponsored exhibits at the Chicago and New York World Fairs which were seen by hundreds of thousands. The landmark film, "Birth of a Baby," produced under the auspices of the American Committee on Maternal Health, was widely shown. The educational work of thousands of local health departments also helped foster a greater knowledge of the need for adequate prenatal, intranatal, and postnatal care for mothers.

Although it is impossible to measure their comparative contributions with any degree of precision, all of these factors played some role in reducing the high level of maternal deaths to a fraction of their previous toll. A major econometric study of maternal mortality conducted in 1950 concluded that for the first time in history a large nation like the United States had pushed its puerperal death rate slightly under the apparently irreducible minimum of one maternal death per 1,000 live births. Seeking an explanation for this finding, the authors compared maternal deaths by cause in 1933 and 1948, assigning three major reasons for the decline—better prenatal care, introduction of antibiotics and other drugs, and improved medical care of pregnant women (intra- and post-natal), involving more adequate physician training and skills. The reduction in mortality rates, they concluded, indicated that the "improved training and the increased skill of the physician are by far the most important factors."[81] Improved physician ability, which affected all classes of puerperal death, each of which had shown reduction, was thus the key variable in the decline of puerperal mortality.

Better training and physician skills were, to an extent which is unfortunately unmeasurable, effected by education and peer review. Many leading physicians were persuaded that maternal mortality review played a major role in improving physician skill and maintaining accountability during these years. One participant, in a comment typical of many others, observed that he "learned more obstetrics by sitting on the Maternal Welfare Committee in Chicago" than in all his other efforts in forty years of medicine.[82] Dr. Philip

---

[81] Dickinson and Welker, "Maternal mortality," 1399.

[82] Cited in Marmol et al., "History of the maternal mortality study committees," 133

Williams of Philadelphia also commented on the efficacy of continuing year-round obstetric mortality review, as opposed, for example, to institutes and seminars conducted by county medical societies, as a method of extramural graduate education for local physicians and general practitioners.[83]

V

Much of the credit for institutionalizing the review committee as a self-regulatory device goes to the landmark report of the New York Academy of Medicine, whose competent and thorough fact-finding served as an indictment and challenge to physicians, stimulated other investigations across the nation, and demonstrated a viable strategy for self-regulation within the profession.[84]

While the Academy report succeeded in providing a mechanism for reform and regulation in obstetrics, its own prescriptions for the direction of change were largely avoided. Although conservatism in obstetrics was a by-product of the report and the many maternal mortality reviews it engendered, the Committee's cautious endorsement of a maternity scheme based on home confinements of normal pregnancies under the care of trained midwives as well as physicians became almost immediately irrelevant. In the five years after publication of the report, hospitalization of maternity patients in New York City increased by 30% to 91% of all births. Accompanying this change was a decline in the number of midwives in the city from 863 to 280, and a decrease in midwife-attended births from 10% in 1933 to 2% in 1938, a product of stricter regulation by the Department of Health and the closing of the Bellevue School of Midwifery.[85] Similar changes were taking place on the national level.[86]

---

[83] Williams, "Graduate education in obstetrics," 528, 532.

[84] The role of the Academy report in lowering mortality rates throughout the nation was commented upon in 1947 by Dr. George Baehr, president of the New York Academy of Medicine. Baehr noted that corrective action taken by communities after release of the New York study resulted in a 66% decline in maternal mortality rates throughout the country (from 6.6 deaths per 1,000 live births in 1931 to 212 deaths in 1946), thus, by the way, achieving the Academy goal that 2/3 of maternal deaths were preventable. The fact that the decline in New York City, where rates fell 80% over the same period of time (from 6.0–6.2 deaths per 1,000 live births in 1930–32 to 1.4 deaths in 1946), far exceeded that in other cities indicated to Baehr the catalytic role of the Academy report in effecting obstetric improvement. George Baehr, *Maternal Death. A Problem in Preventive Medicine, The New York Academy of Medicine's Study of Fifteen Years Ago* (New York: NYAM, 1947).

[85] Katherine Fayville, "Maternity care in New York City from the public health point of view," *Proceedings of the First American Congress on Obstetrics and Gynecology, 1939*, 533–534. However, in 1931, the Maternity Center Association, a private organization, initiated a home delivery service and nurse-midwifery school, the Lobenstine Midwifery Clinic. Over the next decades, the school trained a small but growing number of public health nurses from many different states in midwifery. Three of the school's original incorporators, Drs. George Kosmak, Benjamin Watson and John O Polak, were members of the Obstetric Advisory Committee to the New York Academy of Medicine's study of maternal mortality. Dr. Kosmak became chairman of the Medical Board of the Maternity Center Association in 1931, serving in this capacity until his death.

The possibility of a basic shift towards a system based on the assumption that birth was not pathologic no longer existed. The 1930s represented a transition period in American obstetrics. By the end of the decade, childbirth had been made safer, but it had advanced irrevocably toward a technological focus. Potentially dangerous medical and surgical practices continued, today affecting infants more often than mothers, though under conditions of greater physician accountability. The New York Academy of Medicine's report on maternal mortality marked a point in time when another option seemed available. The immediate problem—the waste of women's lives in childbirth—was solved. The underlying issue remained.

---

[86] During the next decade, the distribution of live births, according to persons in attendance, increased only for in-hospital deliveries by physicians (from 36.9% of births in 1935 to 84 8% in 1947), and declined significantly for out-of-hospital births attended by physicians (from 50.6% of births in 1935, to 10.1% in 1947). *Vital Statistics*, Special Reports, Feb. 8, 1949, *31* (1), cited by Richard Bolt, "Maternal infant and preschool health," in *Nelson New Loose Leaf Medicine*, 1941, *7* 762.

TEXTS AND DOCUMENTS

SIR WILLIAM OSLER'S AUTOBIOGRAPHICAL NOTES

Edited, annotated and introduced by
EDWARD H. BENSLEY AND DONALD G. BATES

INTRODUCTION

Osler called 1898 his *annus mirabilis*.[1] In that year he was elected a Fellow of the Royal Society, received honorary Doctorates of Laws from the Universities of Aberdeen and Edinburgh, and was offered an honorary Doctorate of Civil Law by the University of Trinity College in Toronto. It was with this *annus mirabilis* that his autobiographical notes commence. Perhaps these honours convinced him that he was becoming famous and that an autobiographical record would be of interest to posterity. Then too, another influence may have been at work. A survey of his publications indicates that his serious involvement in biographical work began in the 1890s.[2] Difficulties in obtaining details of the lives of others may have suggested to him an obligation to keep some record of his own.

With the exception of Osler's comments on his address "The Fixed Period" and its unhappy consequences (f. 74 and fn. 29), the autobiographical record has remained unpublished. With the publication of the "inner history,"[3] the manuscript of which was bound with the autobiographical record, it seemed reasonable to publish the latter as well, and permission for this has been granted by the Board of Curators of the Osler Library.

After starting in 1898, there are no entries for the next two years. Then in 1901 the notes are resumed and entries continue for each year thereafter until 1916, when the record ceases. Probably Osler regarded these notes as merely one of a number of sources of autobiographical material. This is supported by the nature of the notes themselves. He must have realized that they provided a very incomplete and fragmentary account of his activities

---

[1] See f. 68

[2] Maude E. Abbott, *Classified and Annotated Bibliography of Sir William Osler's Publications*, 2nd ed. (Montreal Medical Museum, McGill University, 1939), pp. 91 and 92. Fielding H. Garrison, "Sir William Osler's contributions to medical literature," *Ann. Med. Hist.*, 1919, *2*: 184-187

[3] William Osler, "The inner history of The Johns Hopkins Hospital," edited, annotated and introduced by Donald G. Bates and Edward H. Bensley, *Johns Hopkins Med. J.*, 1969, *125*: 184-194

BULLETIN OF THE HISTORY OF MEDICINE 50 596-618 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

and would require supplementation from other sources. On the other hand, they often contain details not readily obtainable elsewhere. The many mistakes in spelling and the occasional blanks left for later completion indicate that he was making no attempt to produce more than rough notes.

The nature of Osler's text has made it necessary to supply some annotation, but in so doing the editors have exercised restraint. Osler's autobiographical record is best read in conjunction with Cushing's biography.[4] If Cushing's monumental work had been cited freely in preparing footnotes, these would have occupied more space than Osler's own record. Therefore, where relevant information is readily available in Cushing's biography, annotation has not been supplied or has been confined to a brief note.

The editors have not found conclusive evidence that the autobiographical record was made available to Cushing for use in the preparation of his biography of Osler. However, Cushing's long and close association with the Osler family makes it highly probable that he had seen the record at some time or other. Here and there the autobiographical record does provide details not found in Cushing's biography. Examples are Osler's avoidance of two honorary degrees (f. 68), his election as Associé étranger de l'Académie de Médecine (f. 83 and fn. 63) and information about income.[5] Other examples are mentioned in fns. 25 and 59.

The notes were written in Osler's hand and bound in a hard black cover, along with the manuscript of his inner history of the early days of The Johns Hopkins Hospital. As previously mentioned, this latter manuscript has been published[6] and an introduction to it provides a detailed account of the book containing both the "inner history" and the autobiographical section. As there described, the autobiographical notes are enclosed within a dummy copy of a fictitious journal, which Osler had designed as a practical joke on his colleagues in Baltimore. In the book as finally bound, this dummy copy accounts for folios 40-90. Ff. 40-42 consist of the cover, partial table of contents and one page of an article of the fictitious journal. At the top of the next folio (f. 43), in Osler's hand, appears "Autobiographical (see p. 51)." The autobiographical record is written on the recto of ff. 68-86, except for two brief notes on ff. 72 and 83^v. Ff. 87-90 are blank. F. 42^v has glued to it a pink bookmark bearing the following note: " 'Autobiographical (see p. 51)'—this means 51 pages are in this 2nd dummy which he begins with

---

[4] Harvey Cushing, *The Life of Sir William Osler*, 2 vols. (London, Oxford University Press, 1925).

[5] A detailed study of Osler's income is reported in George T. Harrell, "Osler's practice," *Bull. Hist Med*, 1973, *47:* 545-568. This contains much more information than the autobiographical notes.

[6] See n. 3 above.

1898—he evidently meant to fill up these blank 50 pages with an acct of his own life." Although unsigned, this was almost certainly written by Dr. W. W. Francis.[7] If Francis' interpretation is correct, it must be concluded that Osler believed the "blank 50 pages" would suffice to contain his autobiography. Modesty may have played a part in this, but it should be mentioned that Osler admired brevity in such writing. He described Sir Thomas Bodley's autobiography as "perhaps the best ever written—all essentials in 16 pages!"[8]

In preparing the record for publication, the editors have corrected spelling errors and obvious lapses in punctuation, and have incorporated the minor corrections which Osler himself had made. Added material has been placed in square brackets. Otherwise the text which follows is reproduced as written by Osler.

THE AUTOBIOGRAPHICAL NOTES

[Folio 68]

1898—In many ways this has been my *annus mirabilis*. Early in the spring I received notice of election to the Royal Society, a most delightful and unexpected honor. I had not even known that my name was 'up,' as my friends who arranged it had not written. Years ago, the Fellowship had been within the bounds of my ambition, but since I had drifted into the practical side of the profession I had not given the matter a thought. Sir William Gairdner[9] in a note of congratulation told a good story apropos of the letters F.R.S. Sir Frederick Bramwell[10] was consulted one day on an engineering question and on the conclusion of the interview the gentleman, who had consulted him on a previous occasion, said "I suppose the same fee Sir Frederick," naming a sum. Sir Frederick said, "Do you see those letters sir?" "Yes, F.R.S. Fellow of the Royal Society." "Yes" said Sir Frederick "but they mean also Fees Raised Since"—and he named a sum just double that received for the former services. I have had the honorary LL.D. from my alma mater;[11] I avoided two in last year (from Ann Arbor and from Jefferson) by insisting that I had not reached the LL.D. stage of imbecility. This summer I had conferred the Doctor of Laws from Aberdeen and from Edinburgh. For the Aberdeen degree my name was presented by Matthew Hay,[12] in very laudatory terms. The Edinburgh degree came in a Brit. Med. Association batch during the meeting in July. Some 15 or 20 of us from various countries were presented. I came in between [Ottavio] Morisani and [William] Playfair and Sir Ludovic Grant presented me with the following remarks: "The science of medicine in the new world reckons as one of its most illustrious ornaments the distinguished Professor of Medicine in Johns Hopkins University. He has prosecuted research in many directions with conspicuous success, and his published writings cover a wide field. In particular may be mentioned those relating to chorea, the cerebral palsies of children and to morbid conditions of the heart. The lengthy list of offices which he has filled are a certain index of the reputation he enjoys in the profession. But a few days ago the University of Aberdeen conferred upon him its highest degree and today the University of Edinburgh rejoices to follow the example of her northern sister." I came rather flat after Morisani who was the star of the occasion, the smallest dwarf I have ever seen out of a museum. He is the Professor of Obstetrics in Naples.[13] In October Trinity College, Toronto, at which I had spent a year, 1867-68, conferred the degree of D.C.L.[14]

---

[7] As Osler Librarian and as one of Osler's literary executors, Francis was the custodian of the book containing the "inner history" and autobiographical notes.

[8] *Bibliotheca Osleriana* (Montreal and London, McGill-Queen's University Press, 1969), p xxx.

[9] Gairdner, an old friend of Osler, was Professor of Medicine at the University of Glasgow

[10] Bramwell was a well-known, consulting engineer in Britain during the latter part of the 19th century

[11] Osler had received this from McGill University *in absentia*, April 1895.

[12] Dr. Matthew Hay, Professor of Forensic Medicine, University of Aberdeen.

The work of the year was very largely the revision of the 3rd Edition of my text book. This was very thorough and took much time. [L.F.] Barker and [H.M.] Thomas helped me greatly.[15]

[Folio 69]

1901[16]—My life has got into a routine of teaching and practice. I get up at 7 a.m., breakfast at 7.30 and at 8.30 on Monday, Wednesday and Friday go to the Hospital where I make a ward visit until 11, or 11.30. Then I see the private patients and get back about 12.30. After luncheon at 1.30 I see patients, by appointment from 2.30 to 5 p.m., have tea and see a few friends socially, after which there are generally a few consultations outside. On Tuesday, Thursday and Saturday, I remain at home until 11.45 and these hours I try to devote to my literary work. At 12 I take the third year students at the out-patient clinic.

---

[13] The Convocation was held in connection with the 66th Annual Meeting of the British Medical Association at Edinburgh. A list of 20 persons awarded the LL.D on this occasion was published in the *Brit. Med. J* 1898, 2. 319. In this list, Morisani is identified as Professor of Midwifery, University of Naples, and Playfair as Professor of Obstetric Medicine, King's College, London. All the candidates were presented by Sir Ludovic James Grant, Dean of the Faculty of Law and Secretary of Senatus, University of Edinburgh; see A Logan Turner (ed), *History of the University of Edinburgh, 1883-1933* (Edinburgh Oliver and Boyd, 1933), p. 91.

[14] Osler's diploma, on file in the Osler Library, is dated 1902 This agrees with the account by T A Reed (ed.), *A History of the University of Trinity College, Toronto, 1852-1952* (University of Toronto Press, 1952), pp. 122, 123, 238. Perhaps the honour was offered to Osler in 1898 but he did not attend a Convocation until 1902.

[15] At this time, Barker was Resident Pathologist at The Johns Hopkins Hospital and Associate Professor of Anatomy in the School of Medicine. Later (1905) Barker succeeded Osler as Professor of Medicine and Physician-in-Chief at The Johns Hopkins School of Medicine and Hospital Thomas was in charge of the division of neurology at The Johns Hopkins Hospital and was Clinical Professor of Diseases of the Nervous System in the University.

[16] This follows directly after the notes of 1898, there are no entries for 1899 and 1900

I left for England June 17th and got back September 22nd. We spent most of the summer in Scotland. The last two summers we had had a cottage at Swangage. I was very busy in the early part of the year with the fourth Edition of my text book, which appeared in September. There has been a row in England among the publishers, as Appleton's took it away from Pentland, but as they had not copy-righted the work he issued a pirated edition and put the price down to 18s.[17]

In October I got the Yale LL.D. President Hadley.[18]

My professional work increased very much this year. I have analysed it as a matter of interest. There were 780 new patients (exclusive of private patients at the Hospital) of whom 378 came from outside the city—Md. 44; Washington city 59; Va. 57; W.Va. 21; Pa. 39; N.Y. City 22; N.Y. State 8; Ala. 15; Ohio 12; Ga. 7; Mo. 5; Ill. 7; Ind. 1; Del. 2; N.C. 20; S.C. 5; Mich. 4; Col. 2; Mont. 1; Fla. 2; Tex. 2; Cal. 2; Miss. 2; Utah 3; Wis. 2; Wash. 2; N.J. 4; La. 4; R.I. 2; Minn. 3; Mass. 4; Ky. 2; Quebec 5; Ont[ario] 9; N[ova] S[cotia] 1; Mex[ico] 2; W[est] I[ndies] 1—representing 31 states.

I was out of town 33 times professionally, most often to Washington. Two consultations at the White House and several Cabinet Ministers are responsible for a considerable increase in patients from the Capital.

I went twice to the south—Fla. and Thomasville [Georgia]. All together I travelled in the nine months 19,300 miles, making with my summer travelling about 27,000 miles in the year. For the first time my income crossed $40,000. I had $7,100 from my book.[19] My largest fee was $3,000 for going to Thomasville. I saved about $15,000.

[Folio 70]

1902—A quiet year in many ways. I had a very hard winter and never before felt the work to drag particularly as the spring came with the postgraduate work and on some days a congestion of patients. In May I had a severe coryza for a week with involvement of the frontal sinuses. I had too when hard pressed several days of sub-sternal tension, a warning of too high pressure. In October with the opening of the session I cut off two classes which eased my work a bit; I had much annoyance by the pirating of the 4th Edition of my text book in England. Pentland had issued the English editions of the 1st, 2nd and 3rd Edition but Appleton and Co. decided to issue it from their own house in London. Unfortunately they neglected to get the copyright and Pentland within a few weeks issued an edition and reduced the price from 24^{s} to 18^{s}.[20] We had our passages taken for June 17th, but A. and Co. thought that I should at once get out a 5th Edition so as to shut off the sale of the pirated edition in England and Canada. We went to Murray Bay, Q[uebec] and had a delightful summer. 5th Edition issued about Nov. 1st.

---

[17] Osler recorded further details in his entry for 1902 (f 70)

[18] Osler received this honour during the celebration of the bicentenary of Yale in October 1901. The degree was conferred by Mr. Hadley, President of Yale University. Cushing (n 4 above), vol. 1, pp. 566 and 567, records some interesting aspects of this event.

[19] Harrell (n. 5 above) gives the following income figures for 1901—Salary $5000, Book $7,182, Practice $27,896, Total 40,078.

My income for the year of nine months was just $40,000. The large fees make up the income; fifteen patients paid $13,000.

1903—It becomes more and more difficult to meet outside demands. Early in May I was unusually hard-pressed—so many calls to Washington and so many people from a distance. During the week of the Triennial Medical Congress in Washington[21] I was much driven. Returning from Cleveland on [May] the 2nd, I had a call to go to Beury, W. Va. from Dr. Davis; on the 7th one from Roanoke, Va.; on the 10th a call to Athens, Ga.; on the 14th, one from Dr. Prevost of Ottawa to see one of the Ministers; on the 16th a call to New York to see Mr. Stickney; and on the 17th one from Dr. Olmstead of Hamilton, Ont. to see Mrs. White. I sent Thayer to Athens and Futcher to Roanoke. I could not leave the meeting and the Ewalds of Berlin were with us.

On May 27th we left for England and returned Sept. 28th. I spent three weeks in Paris, chiefly at Marie's clinic and visiting the Hospitals.

[Folio 71]

1903 (contd)—The months of July and August we spent at Guernsey, where we had a snug little cottage and enjoyed the beautiful coast and the sailing and fishing. On Oct. 1st I gave the introductory Lecture on the occasion of the opening of the new Buildings for the medical school of the University of Toronto—took for a title "The Master Word in Medicine." Wrote eight or ten clinical papers. F. Vernon an artist in Paris made a *bas relief* of me in bronze, two sizes. Dr. and Mrs. Henry Barton Jacobs arranged it as a surprise for Mrs. Osler. At Xmas I went to Montreal where [Robert) Harris painted my portrait for the Faculty at McGill.[22] In November Mother had a serious illness, but recovered in her 97th year. My sister Ellen died in April aged 62 of cancer of the uterus and peritoneum. She was a great loss at home and to the Church. She had had a sad life—the early death of her husband (Alex. Williamson), and a sickly son who lived to become a sorrow. She devoted herself to our mother and to church work.

---

[20] The "pirating of the 4th edition" necessitated the issue of a new edition (5th) in 1902. Osler explained this in a letter to the *Lancet*, 1903, *1* 1058 The letter is an excellent example of Osler's ability to register a protest without causing offence. In spite of the annoyance and great inconvenience suffered by Osler, his letter to the *Lancet* was worded diplomatically and with a touch of humour.

[21] VI Triennial Congress of American Physicians and Surgeons held in Washington, D.C., May 12-14, 1903

I have become more and more interested in bibliography and have added to my collections many original editions of the old writers in medicine and in general literature.

My income this year reached $47,280—made up of $5,000 from salary, $5200 from text book, $2000 from investments and $35,000 from practice. Considering that this amount was collected from eight months' work it represents what can be done with a comparatively limited consultation. I rarely saw patients until 2.15 p.m. I had two fees of $3000 each and one of $3,471.00, and four $1000 fees, one $2000, and nine $500 fees a total of $17,000 from 17 persons.[23]

I saved about $20,000 and gave away about $9000.

[Folio 72]

1904—A memorable year. In the spring I gave the Ingersoll Lecture at Harvard on Science and Immortality. I had refused three years ago but President Eliot in asking me again said that he found it impossible to get a physician to undertake it—that Billings, Weir Mitchell, Welch and others had refused, and urged me to deal with the question from the standpoint of a practical man. Very foolishly I consented. I had a very hard winter and not much time to give to serious work. It was a compromise—and as such, very naturally pleased neither the Gallionians or the Teresians.[24] It seemed however to take with the public as several impressions (7000 copies in 16 months) sold rapidly. In June Harvard gave me the LL.D.

Early in the year I had a letter from my old teacher Sir John Burdon Sanderson asking if I would consider the possibility of accepting the Regius

---

[22] For the story of this portrait see E. H. Bensley, "Robert Harris portrait of Osler on exhibit," *Osler Library Newsletter*, no. 14, October 1973.

[23] Osler's arithmetic was incorrect; this makes a total of about $20,000 from 17 persons.

[24] For the significance of this comment see William Osler, *Science and Immortality* (Boston and New York, Houghton Mifflin and Company, 1904).

Professorship of Medicine at Oxford, which he had just given up. This seemed to offer the chance of escape from an ever increasing pressure of work. I could not bear to give up teaching and become a mere money-machine and yet the Hospital work, the exacting practice and the many calls of outside affairs were telling on my strength. In spite of the most careful regulation of my time and health I was often utterly 'used up' at the end of the week, and the question was how long could I hold out at the high pressure. The increased work at home necessitated an extra secretary. Miss Humpton who had been with me since 1889 took charge of patients, notes of cases and the text-book and Miss Nicola Smith of the correspondence which had become a very heavy tax. The Oxford position was attractive from the leisure it was sure to give, and the prospect of finishing a lot of literary work. I had reached the stage when I was always in arrears and it seemed impossible to get time for serious work. On the other hand it seemed cruel to leave all my dear friends, and the young fellows with whom I had become so intimate, and the profession of America which had done so much for me. I wrote to Sir John saying that it did not seem possible to leave my present position, which I regarded as the premier

[Folio 73]

place in clinical medicine in the English speaking world. He replied that there was no hurry, and that we could talk matters over when I came to the B[ritish] M[edical] A[ssociation] in July. At Oxford, where I was given the honorary D. Sc., I went over the whole ground. The position was purely academic, largely executive—the head of the medical school, with no hospital work, and only by statute sixteen lectures; but in the profession and socially in England the place was one of dignity and importance. About July 31st I had a letter from Mr. Balfour, the Premier, formally offering me the place. After an exchange of cables with Mrs. Osler I accepted.[25] All along she was in favor of the change, feeling the pace of my present life could have but one ending—a serious breakdown. I arranged to spend the session in Baltimore. There was a perfect chorus of lamentations, lay and medical. In

---

[25] After the word "cables" is an asterisk. This refers to the following note on the page opposite (f 72^{r}). Mrs. Osler cabled me "Do not procrastinate, accept. Better go in a steamer than go in a pine-box." Cushing (n. 4 above), vol. 1, p. 649 has a different and less emphatic version. During a visit to New Haven in 1912, Osler remarked that his life in Baltimore became so strenuous that one of two alternatives was open to him The first, to accept the Regius Professorship at Oxford, or the second, to leave Baltimore in a pine box Osler added that he did not much care which alternative he adopted, but that Mrs. Osler was very anxious to have him accept the first one, See Walter R. Steiner, "Reminiscences of Sir William Osler as my teacher and of my hospital experiences under him at Johns Hopkins," *Trans. Am. Clin. & Climatol. Assoc.*, 1935, *51* LI-LXII.

England the news of the appointment was very well received, tho all my friends wondered not a little that I should give up such a splendid clinical position for a comparative sinecure. Financially, of course, it meant a tremendous sacrifice, lopping off at least three fourths of my income;[26] but with my book and what I had saved with the salary—which I knew was small, but about which I had not asked—and Mrs. Osler's private income—about $5000—I felt sure that we could live quietly and happily.

I had a very hard winter. I worked at the new edition of my text-book and in November I issued in London and Phila. a collected edition of my addresses, under the title Aequanimitas; three impressions of which were called for within the year. I cut down practice as much as possible, refusing many long distance calls as I knew there would be a heavy strain in the spring with addresses, dinners etc.

My income for the year was $40,638 from 7½ months work.

[Folio 74]
1905[27]—It is an interesting experience to waken in the morning and find oneself "infamous"—the country ringing with criticism and the mail bringing reams of abuse. This is what happened to me on the 23rd of February. On the 22nd I gave the University address and made it a sort of valedictory. I had always had the idea and had talked about it very much—that after 40 no very great work was done. From Montaigne I think I got it. Then Anthony Trollope's novel "The Fixed Period" and a contemplation of the burdens, mistakes, and calamities of old age had made me pick upon 60 as the age when a man should get out of harness. In my address I dwelt upon these two points and in a humorous way spoke of the advantage it would be to universities if at the 60th year Professors were made to retire into a college—as in the Fixed Period—for a year at the end of which they were to be quietly chloroformed, which was Trollope's suggestion. There was a good laugh, and I expressed my own doubts of the advisability of the scheme as I was myself approaching 60. The exact words may now be read in the printed

---

[26] Figures given by Harrell (n. 5 above), show that Osler's income did indeed drop with the move to Oxford but by no means as much as Osler anticipated.

[27] Although designated "1905," this entry covers only the months prior to Osler's move to Oxford in May. Indeed, except for the last two sentences, the entire entry for 1905 is devoted to his Valedictory Address at Johns Hopkins, "The Fixed Period," and its unhappy consequences. This incident has been described in some detail by Charles G. Roland, "The infamous William Osler," *J.A.M.A.*, 1965, *193*. 436-438. Public reaction to "The Fixed Period" caused Osler considerable distress. The entry for 1905 indicates how overwhelming was his preoccupation with this. Thus he did not mention two other valedictory addresses of 1905—"The Student Life" and "Unity, Peace and Concord," or his LL.D. from Johns Hopkins, received February 1905

address "The Fixed Period." That evening at the dinner we joked about it but no one seemed to have thought anything very extraordinary had been said. But—the next morning when the papers came out—the N.Y. Journal, the Herald and the World—and the local papers. Big headlines. 'Useless at 40.' "Professor Osler recommends all at 60 to be chloroformed." "Lethal chamber for the aged." The fat was in the fire. Such a row! The truth is I had had a big advertisement in the comments made upon my Oxford appointment, and it was a slack season for news. Newspapers, letters, clippings poured in and within 48 hours things began to look serious. No paper contained a correct statement of what I did say so I sent it in two or three paragraphs to the N.Y. Sun. Then I cut the matter off—as far as it was possible. I read nothing more about it and refused all interviews. But it was a deuce of a row and I was more sorry for my friends than I can tell. Mrs. Osler was very worried but I made up my mind to take Plato's advice and creep under the wall of silence until the storm blew over. The newspapers worked it as good material regardless altogether of the occasion or the actual words. I do not believe any one took the trouble to give exactly what I said. One or two tried to be decent, the N.Y. Sun and the N.Y. Post—and E.S. Martin[28] wrote some capital paragraphs in Harper's Weekly. To "Oslerize"—"Oslerized" became common expressions. The hubbub did a good deal of harm, and I was heartily sorry for the many old people who were hurt by the outcry. Good came to a few—in stirring up slackers and training the young men to work. I was pestered to death with reporters and for months I could not sign my name in an hotel register. I kept a stiff upper lip so as not to let the thing get on my nerves; but it was an anxious and distressing time.[29] It was really heart-breaking to leave Baltimore and all the people I loved so dearly and had done so much for me. On May [2nd] the profession gave me a dinner at the Waldorf [-Astoria] in New York.[30]

[Folio 75][31]
May 27th, 1906.—Today finishes my first year in Oxford. On the whole I have stood the change better than I expected. It was very hard at first. I

---

[28] Edward Sanford Martin, poet, essayist, a regular contributor to *Harper's Weekly*.

[29] On the centenary of Osler's birth, W. W. Francis published "Osler and the reporters with an unpublished note on 'The Fixed Period.' " *Canad. Med. Assoc. J.*, 1949, *61*. 68-69 Francis did not divulge the source of the "unpublished note," but it is almost surely taken from this account.

[30] A farewell dinner given by the medical profession of the United States and Canada Osler's address was entitled "L'envoi."

[31] The period covered by ff. 75 and 76, under the date May 27th, 1906, commences with Osler's arrival in Oxford, May 1905 The end of the period covered is not so readily determined; probably it is the late summer or autumn of 1906. The second edition of Aequanimitas was published in August 1906

missed my old associates and young men with whom I had become so intimate. We have been in Mrs. Max. Mullers house 7 Norham Gardens and have been most comfortable. We were both homesick for a week or two, and I confess to one or two restless and sleepless nights, and yet it seemed unreasonable to worry and I set my face steadfastly towards the East, resolved to make the best of the new circumstances. The term was nearly over when we arrived, so I did not lecture. Everyone was most kind, particularly the local physicians. I was elected an active consultant at the Radcliffe Infirmary with the privilege of teaching in all the wards and of utilizing any of the out-patients. When in Baltimore I had had a letter from the Vice Chancellor, Dr. Munro, asking me to join Oriel and I had a private letter from a New College man asking if I would care to join them. Just as I had decided to accept Oriel, I had a cable from the Dean of Christ Church offering a studentship (Fellowship) which I at once accepted, as the House had special attractions for me. I was elected to the Hebdomadal Council, the managing board of the University, and a Delegate to the Press.[32] We went to Scotland for a month in the summer and in October settled down to begin our new life. Marjorie Howard[33] was with us. I arranged a clinique at the Infirmary, once a week, 2.15-4 Wednesdays, and had a group of 16 undergraduates and always 8 or ten doctors. There was an abundance of material, enough to keep me in touch with clinical work. In Dec. we went out to Canada. I spent the month of January at the Hospital in Baltimore, taking the classes three or four times a week and trying to look up some of my clinical material in aneurism and Typhoid fever. I had so many calls upon my time and I had to travel about so much that I did not have a very satisfactory visit so far as work was concerned. I got back about Feb. 10th. I have begun to do a little practice—My receipts for the year have been £4268, of which £1158 was from patients. Our expenses have been much less than in Baltimore, only .[34]

I have had on the whole an idle year. When I came over I was thoroughly used up and for six weeks

[Folio 76]
I did not feel fit for much. In July I was asked to give the Harveian Oration at the Royal College of Physicians (Oct. 1906) and I have had this in my mind

---

[32] The Oxford University Press to which Osler had been appointed a Delegate in 1905.

[33] Marjorie Howard was a daughter of Dr. R. Palmer Howard, Osler's former teacher at McGill University. She later became Mrs. T. B. Futcher. Her husband was a member of the medical staff of The Johns Hopkins Hospital.

[34] Osler neglected to enter the amount of expenses.

and my reading has been largely directed to 17th century literature. I have been trying to get at some important work in connection with the new System of Medicine I am editing for Lea Bros. Phila. but so far I have done nothing. One thing has been the unsettled state in which we have lived. My books are still stored. I have a few at my rooms at Christ Church, and a few at my rooms at the museums, but I have not felt fit for much continued literary effort. I gave addresses on Sir Thos. Browne at Guy's Hospital in October and gave addresses at Cardiff and Bristol but I have had to refuse the score or more of invitations from all parts to lecture etc. In April I went to Munich to the Congress f. Innere Medizin. I have not seen very much of my London friends. I have had overtures from two hospitals to join the staff regularly but I do not wish to get involved in active work in town. I have consented to give a short course of lectures at St. George's Hospital in June. In January I was elected a member of the Athenaeum Club under Rule 11 allowing the committee to elect 6 or 8 distinguished men each year. I am gradually extending my library. I am trying to pick up only the good editions of the notable men in the profession and the works of the men I am interested in. I got the *de Motu Cordis* (1628) of Harvey under interesting circumstances which I give at the back of the book, in a note.[35] I have just bought a good old Library of 17th and 18th century works for the Johns Hopkins Medical School.[36] W. A. Marburg[37] has sent the money (£200).

Mrs. Osler has borne the transplantation very well. The social calls have been rather exacting, but she is fond of England and likes the life. Our boy has thriven wonderfully in mind and body and enjoys the work and play at school.

This morning while dressing a cable came from the Premier of Ontario "Strong desire you should assume Presidency of the University, am writing."[38] The new Commission has rearranged Toronto University and Loudon[39] has resigned. I am not fit to be president of a college. I have no executive gifts, and I am 15 years too old. All the same it is most gratifying to be remembered by one's native province.

---

[35] See *Bibliotheca Osleriana*, No. 692, pp. 72-73.

[36] This was the Warrington Dispensary Library, see R. Guest-Gornall, "The Warrington Dispensary Library," *Medical History*, 1967, *11*: 285-296.

[37] W. A. Marburg, a member of the Board of Trustees of The Johns Hopkins Hospital and a generous supporter of that institution.

[38] In a letter dated June 12, 1906, Osler wrote that he had had some communication with Whitney (Sir James Whitney, Premier of Ontario) on this subject; see Cushing (n. 4 above), vol. 2, p. 52. When Osler stated "this morning while dressing," he was therefore writing either on the date entered at the commencement of f. 75—May 27, 1906—or shortly thereafter.

[39] James Loudon, President of the University of Toronto; he retired from this post July 1906.

2nd Edition of Aequanimitas appeared with three additional addresses.

Dr. [C.N.B.] Camac has issued under the title "Counsels & Ideals" a volume of selections from my writings, published by the Oxford Press. It has had a great success. (Four impressions were called for in 2 years.)

[Folio 77]
1907—Very happy year. We spent Xmas '06 with Mrs. Revere[40] and Dec. 14th [1906] with my mother in Toronto—her 100th birthday.[41] About 80 of us were present. She was wonderfully well in mind and body and no one enjoyed the festivities more than she did. We returned about the end of January. We went to our new house 13 Norham Gardens. I bought it for £5300 (?) and we have spent about £4500 in additions and alterations—much more than we anticipated. In May I went out again to the [Triennial] Congress of [American] Physicians and Surgeons, Washington but was away only five weeks. Mother died quietly in March, without an illness, just a peaceful euthanasia. She was a remarkable woman—an old time bible Christian with implicit faith in an ever present Deity. Her favourite motto "In quietness and confidence shall be your strength," expressed her attitude of mind. She had a keen sense of humor and was always ready with a joke. A more delightful old age could not be imagined. She had her children to the fourth generation about her, and my sister Mrs. Gwyn and her niece Jeannette Osler looked after her most carefully. She signed her own checks to the last. My brother Edward, who lived with her at 83 Wellesley St., Toronto, died early in May. He had for years been a victim of gout with tophi, arterio-sclerosis etc.

I have been working at the System of Medicine, two volumes of which came out this year. [Thomas] McCrae has really done all the work. I have been sadly derelict about my sections. I seem to have increasing difficulty in finishing a bit of work. I suppose it is a sign of age, and my old vice of literary procrastination lies heavy on me. Heavens! If I had not had it what could I not have written! But I have wasted an enormous amount of time in collecting material which I have never used—Epilepsy in children—sclerosis of the brain—typhoid fever, pneumonia, pleurisy etc. I have material for a dozen monographs which will never be written.

We continue to like the life here. We see a great deal of the Rhodes scholars and we have become very intimate with some of the medical students. Our Sunday afternoons are most popular—20-30 and sometimes more than 60 people, chiefly undergraduates. I am in town a good deal, chiefly for meetings. I am on the Council of the Royal College of Phy[sicians] and on the Library committee and in the new Royal Society of Medicine on the same boards, and on the Council of the British Med. Association. Here I have the Hebdomadal Council, and the Press every week—so that I have rather more than I care for of meetings of this sort. But it is of interest and helps me to a knowledge of the local and professional conditions.

---

[40] Mrs. Revere was Lady Osler's mother

[41] The event is described in Anne Wilkinson, *Lions in the way: A discursive history of the Oslers* (Toronto Macmillan, 1956), Chapter XIX.

I am not doing very much practice—this year chiefly stranded Americans. I have been very much better in health since coming here—no cardiac irregularities, no sub-sternal tension.

[Folio 78]
1908[42]—I gave the Linacre lecture at Cambridge in May on Thomas Linacre with whose life I have been familiar for years and whose works I have collected. The lecture was issued by the Cambridge Press and had a very good sale. I have collected my Biographical Essays under the title of "An Alabama Student etc." and the volume appeared Oct. 1st from the Oxford Press. A French edition of my text book appeared this spring (Steinheil, Paris) and in October a German edition translated by [Edmund] Hoke under the supervision of Prof. [R.] von Jaksch of Prague. I have prepared a new 7th Edition which will be issued early in 1909. I have written several articles for my system and the articles on aneurysm and Stokes-Adams disease for 2nd Edition of Allbutt's system.

In June I was asked by a delegation of the students from all the Faculties to stand for the Lord Rectorship of the Univ. of Edinburgh. As a non political candidate I did not think there was much chance but with the promise of the medical vote I consented. At the election in Oct. I came out at the bottom of the poll. Wyndham the conservative, Winston Churchill [and] I. The papers connected with it, which I have had bound together, are of interest.[43] It was a lively contest, one of the keenest for many years.[44]

We continue to like Oxford, and now feel very much at home. The boy is 12 years old, at school preparing for Winchester, but he has no fondness for books and will never be a student, but he has a good "anlage" and I do not worry. We live a very active life—the house is always full and people are coming and going all the time.[45] We went to Scotland for a month in our motor. In October we came abroad. I have not had a winter 'off' since I began to teach and I have never seen Italy. I came here (Paris) Oct. 1st. We took an apartment (44 Ave. d'Iéna) and have been most comfortable. I have seen a great deal of the Hospital side of the work here and the Dean and members of the Faculty[46] have been most kind. I have kept very well, only when pressed or worried the sub-sternal tension returns. In Nov. Seymour Thomas (11 Impasse Ronsin) an American artist painted my portrait—the best so far, with the exception of Sargent.[47] We remained in Paris until Jan. 15 when we went to Cannes—on to Italy. We spent a month in Rome, a month in Florence, and saw Bologna, Padua, Venice.

---

[42] Although designated 1908, this entry covers not only that year but also 1909 to the time of Osler's return to Oxford from the Continent on April 5th—see first sentence of f 79.

[43] *Bibliotheca Osleriana*, no. 7648

[44] For a detailed account of this contest see Edward H. Bensley, "Osler and the Edinburgh lord rectorship," *Canad. Med. Assoc. J.*, 1974, *111:* 1341-1346.

[Folio 79]
1909[48]—We returned to Oxford April 5th. I was laid up with influenza for a week and then went to America. I spent two weeks in Baltimore, attended the Assoc. of Am. Physicians, visited Boston, N.Y., Phila., Wilkes Barre and Buffalo and early in June gave the address in medicine at Toronto at the Ontario Med. Association. I spent ten days in Montreal and sailed from Quebec about June 18, bringing Marjorie Howard with me. We have had a busy summer, scores of people arriving and going. Bill [Francis] came over with me and Mrs. Revere and the Chapins were here.[49] The Cushings too and Futcher whom Marjorie secured.[50] We went to Cornwall for a few weeks in August and September. I have not done much literary work. I gave the Schorstein Lecture on Syphilis and Aneurism in Oct. Vol. vii of the System is in Press. My collected Biographical Essays—An Alabama Student—published last year has been reprinted. The 7th Edition of my text book appeared in Feb. W. W. Francis read the proofs. I revised them in Paris. The nine months absence has not interfered with the work. I have been very busy since July. I got a new secretary, Miss Powell, July 1st; Miss Nicola Smith who came over with us went back to Batlimore. There is very little quiet during term, always people arriving and going. Here is a full week for exam-

---

[45] See further Richard Doll, "The Open Arms," *Osler Library Newsletter*, no 15, February 1974.

[46] Probably the Faculty of L'Ecole de Médecine.

[47] Courville maintained that the portrait by Seymour Thomas was Osler's favourite and that Osler was not happy with the Sargent portrait (Cyril B. Courville, "Sir William Osler and his portraits, with a brief story of the one painted by Seymour Thomas," *Bull. Hist. Med.*, 1949, *23*: 353-377). Osler's comment "The best so far, with the exception of Sargent" does not confirm this.

[48] This covers the period April 5th, 1909 to the end of that year.

[49] Dr. W. W. ("Bill") Francis' mother was Osler's cousin, but Osler always called W. W Francis a nephew (see also n. 7 above). Mrs. Chapin was Lady Osler's sister and Mrs. Revere was their mother.

[50] See n 33 above

ple. Sunday, December 12th, Rev. W. S. Ramsford of New York and Prof. Robertson of Toronto, and his wife for lunch, about 20 people to tea in the afternoon. Robertson dined in common room with me in the evening. Monday, 13th, 11 a.m. meeting at Marlboro house of King Edward Hospital Fund, 3 [p.m.] meeting about Dresden Historical Exhibit in 1911, 4 [p.m.] National Tub. Committee, 5 [p.m.] Committee of Editors of the Quarterly Journal of Medicine, 8 p.m. dinner, 26 [for Andrew] Macphail of Montreal at the Athenaeum Club. Tuesday, 11.30, committee of Curators of Bodleian. Wednesday, 15, Meeting of Curators of Bodleian to settle underground storage room, 5 p.m. Royal Medical Society meeting in London. 16th, dinner in London to settle the Beit memorial fellowship (at [?]). 17th, Congregation and present [?] for degrees, at 10^{00} Mr. Plumpton of N.Y. at lunch. In eve, dinner in London of staff of King's Sanatorium. Saturday, 18th, County medical officer of Health at lunch, at 3 meeting at the house of 36 people to discuss the Tuberculosis problem in Oxford and all stayed to tea.

[Folio 80]
1910—Very busy year—but not much done in the way of literary work. Correspondence more and more exacting—2 or 3 hours given to it every morning. System of medicine, seven vol. finished. [Thomas] McCrae did all the work. I have done a good deal of desultory work in bibliography and the history of medicine. Library grows, and I have added a number of good items. Usual no. of addresses etc., though if I accepted all I am asked to give I would do little else. In July I presided at the Edinboro Tuberculosis conference, and on the Sunday gave an address on "Man's Redemption of Man" in the McEwan Hall to an audience of about 2500. Gave an address at Newcastle on The Hospital Unit in University work, and another at Nottingham upon the organization of the Profession—both in Lancet and B.M.J. I spent two weeks in Paris in the spring. On July 28 sailed for Quebec, Empress of Ireland, with G.R.O. and E.R.O.[51] taking Ottilie Wright and Nona Gwyn[52] who had spent the summer with us. We had two weeks at Murray Bay and then I visited Toronto, Hamilton, Baltimore, Boston and New York, sailing on the Kaiser Wilhelm II Tuesday, Sept. 6th.

In January I had my 2nd attack of kidney colic—the first was 8 years ago. It took six days to grind out a small stone. I had several bad colds in the autumn and was in bed one week in Nov. with mild bronchitis.

---

[51] Grace Revere Osler and Edward Revere Osler.

[52] Ottilie Wright was a daughter of Dr. Henry P. Wright. Wright and Osler were room-mates when they were medical students at McGill University—an association which led to a lifelong friendship between the Osler and Wright families Nona Gwyn was a niece of Osler; she later became Mrs. C Stuart

Ottilie Wright (from Ottawa) and Nona Gwyn with us all summer. E[dward] R[evere] at Winchester and very happy.

[Folio 81]
1911—In Feb. I joined my brother E[dmund] B[oyd] O[sler] in Egypt and was away until April 1st. Delightful trip—5 weeks on the river. Ottilie [Wright] and Nona [Gwyn] returned for the summer. Very difficult to get any work done—so many people going and coming and I am so much in town. I really get less continuous time for literary work than when I was busiest in Baltimore, for then I often had three free mornings a week when I shut myself up.

June the [11th] I had the following letter from the Prime Minister, Mr. Asquith. [Osler left a space here, but neglected to copy the letter.][53]

When I first came over in 1905, in the autumn Sir William Broadbent asked me to call as he wished to talk over the question of getting some court honour for me. He had stopped with my brother E[dmund] B[oyd] in Toronto and had seen my mother and was evidently much taken with the family. I gathered from what he said that he had already spoken to the King. I told him to do nothing further in the matter. I was a stranger, regarded as an American, and it was hardly fair to give me any titular distinction in so early a period of my residence. Broadbent died, (he was the King's physician) and the matter dropped and I gave it no further thought. I had had more than my share and was very happy and quite content. I had really had a great deal more than I deserved. I would not pull wires and I had no special count in political influence so that Asquith's letter came as a genuine surprise. I was glad that a baronetcy was offered as I would not have taken anything else.[54] With what Mrs. Osler will have and I can leave the boy can be comfortable, tho. it is a dubious business for him. Still he is a good sort and though not bright at books like so many of my family he has uncommon good sense and will make a level headed man. The appointment was very popular. We had hundreds of letters and cables and telegrams within 48 hours. It must have been distributed widely in the newspapers on the other side as I had about 50 cables within 24 hours. I am awfully glad for the sake of the family in Canada. It has been a long pull from that parsonage at Tecumseth[55] to a Baronetcy of the United Kingdom. I only wish father and mother could have lived to see it, and my brother B.B. and my sister Nellie.[56]

---

[53] Asquith's letter is in the Osler Library archives. Dated 9th June, 1911 from 10, Downing Street, it reads as follows. "I have had the honour of receiving a command from The King to inform you that it is His Majesty's gracious intention to confer the honour of a Baronetcy of the United Kingdom upon you on the occasion of His Majesty's approaching Coronation. I have the honour to be, Sir, Your obedient Servant, H H. Asquith."

[54] Did Osler mean that he would not have accepted a lower honour? In view of his earlier diffidence, this interpretation is as unlikely as it is unflattering. A higher honour? His comments about Revere could signify Osler's belief that a higher hereditary title would become an embarrassment to his son, financially or otherwise. Probably Osler should be taken quite literally here: a baronetcy struck him as precisely appropriate No doubt if Olser had edited his notes later, he would have amplified this. For further evidence of his reaction to the baronetcy see Cushing (n 5 above), vol. 2, pp. 275-278.

We spent the summer in north Wales. Campbell Howard became engaged to Ottilie Wright to our great joy.[57]

[Folio 82]
1912—Finished the 8th Edition of the text book which was published about Sept. 15 in N.Y. and sent here in time for the October sales. An Edition of 12,000 was sold before Oct. 10th and a 2nd printing of 5,000 was ordered. This edition was much changed and took a great deal of work. In the 20 years I have received from the book $. [58] I have never been able to get Appleton's to raise the royalty above 12½. The book is not an expensive one to produce so they must have made a good pile. On the whole I have not done badly and practically all the money I have saved has come from it. It is interesting to note that in the 7 years I have been in England I have saved and invested as much as I had when I came over. We spent the summer holiday at Tongue N[orth] B[ritain].

1913—Very busy year. The early winter was spent in preparing the Silliman lectures for Yale. I sailed to N.Y. on the [5th of April], went to the opening of the Phipps Institute at Baltimore, spent 10 days at Yale where I lectured on "The Evolution on Modern Medicine." Very good audiences all through and a very happy visit. I loved the men at Yale, so genuine. Went on to Boston then back to Phila.—Baltimore—Washington. Went on to Toronto and sailed from Montreal on the [23rd of May].

Not much bothered by newspapers but they circulated three lies, first that I had come on the steamer under an assumed name, 2nd that Cardinal Gibbons had taken umbrage at remarks in my lecture. This was spread broadcast all over the country. The truth is, as he wrote me, he had not read a word of it, and the 3rd was really serious as it was cabled to England that I was seriously ill in a Sanitorium in Boston. Grace heard it before she got my cable and was of course much upset.[59] Altogether I had a splendid visit and enjoyed every minute.

---

[55] Osler was born in a parsonage at Bond Head, Tecumseth County, Upper Canada

[56] Britton Bath Osler (died 1901) and Ellen Mary Osler (died 1903)

[57] Ottilie Wright later married Dr. Campbell P. Howard, a son of Dr. R. Palmer Howard, Osler's former teacher at McGill University (see also n. 52 above).

[58] Osler neglected to enter the amount

In Oct. 1912 the Prince of Wales[60] came into residence at Magdalen College and I had word from the court officials that the King wished me to look after his health. While I was away he was not well—Collier[61] took charge. I have seen him several times this year, a delicate looking lad, immature—not well grown, thin and wiry, and not very happy in his job! The Navy was his desire. He is doing well here and the life is bringing out his good qualities. He will always be small.

[Folio 83]
June, 1914[62]—Interesting month. I had an honorary degree (DSc) at Cambridge. The Academy of Medicine Paris gave [me] the associated membership.[63] There were eight candidates from different countries for two places, a Belgian got 52 and I got 46 votes. I was nominated President of the Royal Society of Medicine, London by the Council but felt I must decline. Too much work! Sir William Anson the senior representative of the University in Parliament died. Last week both Liberal and Conservative caucuses nominated me and I had deputations from both parties to say that if I accepted they would make it unanimous. I did not think it right at my time of life to take up new duties—I remembered the parliamentary fate of my friend Sir Michael Foster. I have just been nominated for the Roxburghe club, the elite of bibliographical bodies.

On the 16th June I had an interesting experience in practice seeing professionally the son of the King and the son of his prime minister (Asquith) on the same day.

At the end of July I went to Aberdeen to the British Medical Association, and stayed with Ashley Mackintosh. I went on to Colonsay to the Strathconas, while Lady Osler and Revere sailed to Montreal July 31st. I had arranged to follow Sept. 5th to take part in the Johns Hopkins Hospital celebration of the 25th anniversary of the foundation. While at Colonsay news came of the declaration of war. We could not get away from the Island for several days. I immediately cancelled my passage and cabled Grace to return as soon as safe, which they did by the same steamer. The skeleton of the base Hospital at Oxford had been prepared several years ago, and within a month it was ready for 500 patients. I helped in the organization of the Canadian and American Hospitals, and took part in the inoculation work on typhoid fever. We have had a very busy time, helping the Belgian professors who came to England of whom we have settled 21 here with their families. Within a week after the sack of Louvain, Grace had written to her American friends and she has raised more than £3000, and the Rockefeller Foundation has offered £4000. She worked so hard as chairman of the University guild for making clothes etc. for the soldiers. I have been a great deal away visiting hospitals and seeing special cases.

---

[59] Cushing (n. 4 above), vol. 2, pp 352 and 353 described the report involving Cardinal Gibbons, but did not mention the two other "lies."

[60] Later King Edward VIII who abdicated and became the Duke of Windsor.

[61] William Collier, one of Osler's colleagues at the Radcliffe Infirmary

[62] Although designated "1914 *June*," the period covered is May to December of that year

[63] The diploma on file in the Osler Library records that Osler was elected Associé étranger de l'Académie de Médecine, Paris, June 2, 1914.

Revere came up to Christ Church in October and has joined the Officers Training Corps. He has developed rapidly and is taking a great interest in English Literature and in bibliography.

My library has grown rapidly largely owing to my

[Folio 84]
brother, Sir E[dmund] B[oyd's] gifts of £750 last year and £200 in July of this year. I have a definite scheme of a special collection for McGill.

It has been a season of much worry and apprehension. The break with Germany has been a great shock, as we have so many warm personal friends and my associations with the country have been so intimate. The most distressing thing has been the hopeless misunderstanding as so well shown in the manifesto of the German professors and the reply which we made to it. To get at the truth seems impossible—our course seems to be so just to us, as seems theirs to them. As Rabbi Ben Ezra says "Now who shall arbitrate"?

In December I was reelected President of the Bibliographical Society.[64]

With Dr. [Thomas] McCrae a 2nd Edition of the *Modern Medicine*[65] is in the press in five, instead of seven volumes.

I have procrastinated in a disgraceful way about my Yale Lectures on the Evolution of Modern Medicine which has been in print and I have had the galleys for more than a year! I am not quite satisfied with it, but the year has not been wasted as I have had a rapidly increasing knowledge of books and the original literature in medicine.[66]

---

[64] At this point there is an asterisk which refers to the following note on the page opposite (f. 83^{v}): I was nominated by the Council President of the Royal Society of Medicine, London, but declined election. I have had enough of this kind of honour

[65] There are several references in Osler's notes to *A System of Medicine* edited by Osler and Thomas McCrae. *A System of Medicine* was the title preferred by the editors and used by the British publishers Here Osler calls it *Modern Medicine*; this was the title used by the publishers in the United States. See Maude E Abbott (n. 2 above), p. 132.

1915 Horrid year full of worry and sorrows. Revere came up to Christ Church in October 1914 where he had some very nice friends. One after another they took commissions. He was not 19 until the end of the year, and loathed the whole business of the war. He was however in the O[fficers] T[raining] C[orps] and was about to apply for a commission when we had a cable from Dr. Birkett asking him to join the McGill Unit[67] as assistant Quarter-master. He was assigned to Cliveden first then to Bromley—joined the McGill men at Shorncliffe when they came over in May. In June he went to Camiers, France and has been with them for the remainder of the year. They have been in a beastly hole, and very miserable. We hope to hear any day of R.'s transference to the Field Ambulance. The terrible worry has been the sad losses of our friends—Norman Moore, Herringham, Champneys, Garrod, Rolleston, Hale-White, Chapman, Power, Ronald Ross, Handford (2), Pollard (2), Schäfer—it is a sad list.[68] About a dozen members of the family are over from Canada and in all 22 are serving. I have been very busy at times, chiefly seeing war cases, and go to Taplow to the Canadian Hospital every Monday,

[Folio 85]
to Paignton (American Hospital) and Beechborough Park (Canadian Hospital) whenever they have a good batch of medical cases. Considering the general depression I did very well in practice and had a good many important outside consultations. The most interesting man I saw was the foreign Minister Sir Edward Grey—remarkable pigmentary retinitis, threatening his acute vision. I went to France in September and saw the English and Canadian Hospitals and went to the front (see account in Leeds address *Science & War*). Did not go away in the summer. 2nd Edition of my System of Medicine (with Dr. T. McCrae) completed. Not much literary work, but I am doing more and more work in the small library and getting a better know-

---

[64] Osler never completed this task. The lectures were eventually edited and published after Osler's death See Sir William Osler, *The Evolution of Modern Medicine· A Series of Lectures Delivered at Yale University on the Silliman Foundation in April, 1913* (New Haven Yale University Press, 1923).

[67] Colonel Herbert Stanley Birkett was Officer Commanding, No. 3 Canadian General Hospital, the "McGill Unit."

[68] An entry in one of Osler's Day Books in the Osler Library (vol. 12, p. 188) indicates that these are names of Osler's friends whose sons had been killed After Handford's name Osler wrote "2 in same day." Thus (2) refers to the loss of two sons

ledge of the books. Narrow escape in Nov—with a fire in the dining room. Only serious loss the Vernon bronze which the Jacobs had done of me in Paris.

Interesting to see the country wake up to the seriousness and importance of the war. The colleges are deserted at which only about 20 men, chiefly Rhodes Scholars and weaklings. We do not dine in Hall but in common room. Terrible losses and the dons much depressed. Most of the younger ones are away. The country has done well, for a democracy, better than the politicians and the newspapers. Grace has had a very busy year, head of the working guild. For 66+ I keep very well. I gave up my University salary as the 'chest' was very low. Revere had become more and more interested in books and has decided to take the English literature course—if he ever returns. It is extraordinary how much he has developed mentally and what good taste and judgement he has in literary matters. Secretary (Mr. Enoch), butler and chauffeur have all gone to the war.

I gave away of my income saved [69]

[Folio 86]

1916—Revere got his transfer to the Royal Field Artillery—after a long and vexatious delay. May 15, he has just left for Newcastle to join the Reserve Brigade there. He has been at home for five weeks. The year away has matured him. He did not like the work at No. 3 Canadian [General Hospital]. Dr. Birkett and all the men were most kind, but his heart was not in it. He has developed a really fine taste in literature and has picked up an extraordinary knowledge of the Walton circle. If he gets back from the war the way of life is clear. Oct. 16th he left for France, and for two weeks was attached to the ammunition columns and then sent to Battery A. 59th Brigade stationed on the Ancre about ? miles north of Albert. It is heart-breaking to have him away.[70]

Very unpleasant row in the C[anadian] A[rmy] M[edical] C[orps] in which I had to take a hand. The correspondence etc. and copies of the cables, all bound together, may be seen in the library.[71]

I had a hard and worrying term, so much away and so many anxieties about the war. At the end of Dec. I had a sharp attack of bronchitis—I suspect there was a broncho-pneumonia—which laid me up for three weeks.

---

[69] Osler neglected to enter the amount.

[70] On August 29th, 1917, Battery A of the 59th Brigade received a direct hit and Lieutenant Revere Osler was gravely wounded; he died the next morning.

[71] This "row" is described in some detail by Cushing (n 4 above), vol. 2, pp. 536-539. Copies of the correspondence and cables are in the Harvey Cushing papers at McGill University.

The Library grows, and I have now a definite scheme of classification. A Miss Willcock came Oct. 1st to help Mr. [R.H.] Hill of the Bodleian who has been doing the work since Mr. Enoch left.[72]

---

[72] Mr. Enoch had been Osler's secretary. His departure was previously noted by Osler (f. 85). The autobiographical record ends here. The remainder of f. 86 and ff. 87 to 90 are blank.

MEDICO-HISTORICAL NEWS AND ACTIVITIES

CORRESPONDENCE AND REPORTS

BENJAMIN SPECTOR, M.D.
1893-1976

Benjamin Spector was born on July 8, 1893, in Brooklyn, that melting pot where social alchemy transformed so many of Europe's wretched oppressed into American nobility. He was educated in the public schools of that city and then earned his M.D. in 1922 at Bellevue Hospital Medical College, which by that time was the New York University College of Medicine. He soon became interested in anatomy and took additional training at the Mayo Clinic, Mount Desert Island Biological Laboratory, Groningen, and Utrecht.

Dr. Spector's long teaching career began at New York University where he was an instructor in anatomy as early as 1915. Seven years later, he began a four-decade love affair with Tufts College Medical School, starting as assistant professor of anatomy. In the midst of the Depression, he was made professor and chairman of the Department of Anatomy at Tufts.

A great teacher, he stimulated the young tyro to study and do for himself. Kindly and modest, he always maintained a humane, dedicated interest in all his students. Four thousand medical students and three thousand dental students profited not only from his teaching of anatomy, but from the remarkable influence he exerted in building their personal characters and enriching them culturally. His anatomical research included studies on the internal ear, cardiac anomalies, and bone repair. The Ford Fellowship in Bioanatomy at Tufts was established by his admiring friends, Mr. and Mrs. Joseph Ford of Boston, in his honor.

Anatomy was a dead word to this admirable teacher. Thus, his section of the Medical School became the Department of Bioanatomy. "Be happy with the little you know. The rest will take care of itself," he often told his students. Bioanatomy is "a diagnostic and prognostic tool—the human body is as complicated as ever. A student must never think of the body as a collection of separate parts, but as a physical and spiritual entity."

Dr. Spector, from the beginning of his teaching career, surrounded his students with evidences of the historical people and events that led to the medical advantages we enjoy today. For six successive years, beginning in 1930, he presented to the entering classes of medical students historical pageants in which the upper classmen participated as actors. In this way the students' cultural interests, already stimulated by premedical tastes of liberal arts, continued to be encouraged in medical school. Dr. Spector compiled the text of each pageant and then published them in a series of five booklets entitled, *One Hour of Medical History*. Always active in the affairs of the Boston Medical Library, he enlisted the aid of its Director, James F. Ballard, in preparing a bibliographic section for each issue. In 1939, his efforts were rewarded by

BULLETIN OF THE HISTORY OF MEDICINE 50 619-629 (1976)
Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

being appointed professor of the history of medicine at Tufts.

His methods of teaching medical history were exciting. Feeling that students would not sit still for lectures, he organized informal seminars. These were held in the anatomy museum, usually on Monday evening at 5. While sipping tea and crunching cookies, we heard about such topics as "From the Father of Genetics, Gregor Mendel," to "Watson–Crick Model of DNA."

In 1943, he published a *History of Tufts College Medical School* prepared for its semi-centennial, 1893-1943. For five years he searched for archives of the College, from the Massachusetts State House to the garrets of former graduates, poring over letters, papers, and documents to compile the history. Tireless and diligent, he was intentionally a recorder of facts substantiated by the documentary evidence he ferreted out of hiding; yet, he pointed out, the collection of facts is but the beginning and not the end of the task of a historian. When he presented a copy of his book to Victor Robinson, a close and intimate friend, he mentioned the difficulties entailed in digging out the material for it; and in the presentation inscription marked the many pleasant moments they had spent together discussing the history of medicine.

His wife, Bertha, was his "Pal" whom he endearingly called "Buddy." She was a lawyer and in all his activities was his guide and active participant. She worked with him in writing the five booklets on *One Hour of Medical History, The History of Tufts Medical School,* and The Fielding H. Garrison Lecture of the American Association for the History of Medicine which he entitled: *The Growth of Medicine and the Letter of the Law*. She died in 1958 and his grief was inconsolable. Two years later, through contributions from friends, faculty, and students, the Bertha Spector Award in the History of Medicine was established. This provides a medal and certificate to be awarded to any student at Tufts University School of Medicine who submits an essay on a topic in medical history or its related field that is judged to be of academic excellence.

In 1963, at the age of 70, Dr. Spector became Emeritus at Tufts. The Boston medical community, however, realized it was a mistake, just because he was 70, to shunt off a man who was doing a good job. He was not senile by any means and there was the example before him of Dr. Piper of the dental school who was still teaching dental history at Tufts at the age of 92, walking from the college to his home at least ten miles away. Accordingly, Spector was eagerly welcomed at Harvard Medical School as an affiliate in anatomy, to act as Coordinator of Anatomical Material for all three Boston medical schools. In this role he promoted an increasing awareness in the public mind of the need for anatomical material for study and teaching. He also encouraged people to donate their bodies for this worthy purpose. Five years later, he was able to testify there was a great increase in the number of requests for the forms and instructions concerning such donations and noted that the public has come to realize that there can be no road to knowledge about the structure of the "fearfully and wonderfully made" human form other than through human dissection by students and physicians. So prepared, he said, a physician can carry out his obligation to prolong life, to mitigate human suffering, and to foster freedom of the mind and body in the physically and mentally handicapped. A man of perseverence and tact, he worked indefatigably to achieve his goals.

At his retirement, a plaque presented to the medical alumni of Tufts was hung in the anatomy laboratory. It was dedicated to Benjamin Spector, M.D., F.R.M.S., in recognition of his 40 years of service at Tufts, 30 years as professor and chairman of the Department of Bioanatomy, 24 years as professor of the history of medicine. In his valedictory address on the Spiritual Orientation of the Doctor, he emphasized humanism in medicine, pointing out to the graduating class of 1963 that to treat the whole person one must add to the physico-chemical approach to scientific medicine the further idea that man is spirit as well as body and mind.

Born to the Jewish faith, he developed his own creed and quoted frequently from the Bible, the New Testament, as well as the Old, to bring home the human values in the practice of medicine. Compassion, he said, was the quintessence of the art of medicine.

He was a popular teacher and popular with the alumni. At the annual alumni dinner in 1963, the year of his retirement, he was honored as "Mr. Chips of Tufts Medical School."

The 1963 Yearbook of the Medical School was dedicated to him, in the following words:

"Retiring this year, after forty years with Tufts University School of Medicine, Benjamin Spector leaves the institution he helped nurture. Professor and Chairman of the Department of Bioanatomy since 1933 and Professor of the History of Medicine since 1939 he has been influential in the graduate education of over 4000 medical students and instrumental in the development of the school.

"As time passes and words fade, the measure of a great teacher becomes the impression he leaves with his students. In this age of medical specialization he will be remembered by us as a teacher who was as much concerned with the spirit of man as with his bodily ills. We derived from him an appreciation of medical history, a sense of tradition for the medical school and a concern for the whole patient. Therefore, we dedicate this yearbook to Benjamin Spector the physician, the teacher and the man."

When the Tufts Chapter of the Alpha Omega Honorary Medical Society was inaugurated in 1940, he was chosen an honorary member. He was also an honorary member of the Tufts Medical Alumni Association. President Eisenhower appointed him a member of the Board of Regents of the National Library of Medicine and he served as Honorary Civilian Consultant to the U.S. Army and Navy. He also served as consultant to the New England Medical Center Hospital and was a Fellow of the Royal Microscopical Society. For many years, he served the Phi Delta Epsilon Medical Fraternity of which he was justly proud.

A member of the American Association for the History of Medicine from its early days, he replaced William S. Middleton in 1943 on the executive council. From 1943-48 he was treasurer and in 1948, secretary. In 1949, he was elected president of the Association. It was at this time that he induced Edward B. Krumbhaar to write the short account of the early days of the Association which was published in the *Bulletin;* and while he was president, his friend, Mr. Ford, established the President's Discretionary Fund at a time when the Association led a hand to mouth existence. At the 25th annual meeting in Kansas City in 1952, he delivered the Fielding H. Garrison Lecture.

Among the subjects of his historical papers were those on Charles Darwin, Burton's *Anatomy of Melancholy*, William Osler, Joseph H. Pratt, Sir Charles Bell and the Bridgewater Treatises, and an introduction to Noah Webster's *Letters on Yellow Fever* which he edited as the 9th Supplement to the *Bulletin of the History of Medicine* in 1947.

Dr. Spector died on February 17, 1976. Plagiarizing a poem by Henry L. Cabitt written in 1931 to express the feeling of the Class of 1931:

"To know him was to call him friend; to feel that here was one who shared his soul's emotion. He taught what great men dared; anatomy he loved; to him the human clay no more was dross, but ever bore the light of Godly kin. Philosophy he knew—and preached. Of humor had he full well his lot. Small wonder that we who knew him well partake of his heritage and revere him whom we leave—always to feel his presence."

SAMUEL X RADBILL
LAWRENCE CHARLES PARISH

INTERNATIONAL CONGRESS FOR THE HISTORY OF MEDICINE

The 25th Congress of the International Society for the History of Medicine took place in Quebec, Canada, August 22-28, 1976. It attracted close to three hundred participants from thirty-three countries. These simple statistics imply at once the achievements of the ISHM, and the problems and opportunities attending an international exchange of views on the history of medicine. These will be discussed here from the point of view of the program, the variety of national experience, manpower and perspectives on the field, the ubiquitous challenge of language barriers and certain traditions of the International Society for the History of Medicine that might benefit from thoughtful, constructive, critical review if the Society is to continue to fulfill its mission of providing a scholarly forum at the highest international level.

Warm appreciation is due to the President, Dr. de la Broquerie Fortier, and his associates; his Vice-President, Dr. Jean-Marie Lemieux, chairman of the Program Committee; Dr. Harold N. Segall, the Treasurer; and those two indefatigable, ubiquitous ladies, Dr. Jacqueline D. LaRue, the Secretary-General, and Mme Yolande Bonenfant, the Local Arrangements chairman. These officials, the Rector of Laval University and his staff, the Mayor of Quebec, the Lieutenant-Governor of the Province, the citizens, hotels and shops of Quebec, and indeed the weather, all combined to provide a pleasing and well-regulated buzz of activities for scholars and guests that surrounded all participants with warm hospitality and led our European colleagues to the conclusion that this first ISHM congress in the Western hemisphere should not be the last.

The scientific program consisted of two quite distinct parts: 139 individual papers had been scheduled, from four to eight of them per session, and three or four sessions ran simultaneously, on six half-days. Half of these papers were grouped under the themes of "Popular Medicine," "Medieval Medicine," "Amerindian Medicine," "European Influences on American Medicine"; one session was the work of the new

Hannah Institute for the History of Medicine and Related Sciences, one of the Canadian Society for the History of Medicine; eleven sessions were headed "Varia." A familiar problem had obviously plagued the organizers: if all entries were to be accepted (as has been ISHM custom) a plethora of papers would result. Unfortunately the problem was alleviated in a regrettable way: the scholars from the U.S.S.R. and some other East European countries never arrived.

The range of topics seemed to span the firmament: from "Early surgical instruments excavated in Old Cairo" and "Maimonides' ideas on metabolism" to "Madness in New France" and "Claude Bernard and medical microbiology." How to elicit common themes and a comparative approach from 139 scholars from 33 countries?

The problem of numbers is compounded by the variety of ways in which "historian of medicine" is being defined. Particularly valuable contributions were offered by members who are in fact highly experienced public servants or educators concerned with some aspect of health—often without being either physicians or historians. Other excellent papers distilled a life-time experience in medicine. Others were the work of professional historians of medicine. It is this variety that makes these meetings so lively and appealing. But greater homogeneity of subject matter would be helpful for the audience.

An attempt was made, and this seemed a most promising innovation, to propose a theme and invite certain highly qualified speakers: "Social Medicine" thus inaugurated what will hopefully be a series of biennial symposia. Among authoritative contributions to this theme were those of Drs. A. Gellhorn, New York City; J.-C. Sournia, Paris; Endré Reti, Budapest; George Rosen, New Haven, Conn.; P. Ghalioungui, Cairo; Bengt Lindskog, Lund, J.-R. Risquez, Caracas; Papa Gay, Dakar—to name but a few.

Publication of all papers has been a hallowed tradition of ISHM. As costs mount, this is becoming a heavy financial burden and some selection may become imperative. This multi-national symposium on Social Medicine would be this reporter's prime candidate for wider publication.

For this writer, attending the International Congress for the first time in the official capacity of "Vice-President representing the Americas," the Opening Ceremonies proved to be a startling eye-opener. Formal greetings from the four parts of the world were called for: Africa spoke French, Asia spoke English. South America spoke Portuguese, and your Vice-President said a few words in all the languages that were minimally serviceable. The problem was obvious: in what languages can we scholars communicate profitably at an international meeting?

The problem exists on two levels: the organization of each congress is entirely the responsibility of the host country, therefore the languages for scientific papers are announced individually for each congress. At Quebec these were French, English, German, Spanish and Italian; the program urged: "Session chairmen will attempt to solve linguistic problems during discussion periods after each session." These linguistic problems, however, are only worth grappling with if the audience has understood the papers. Simultaneous translation being prohibitively expensive, the question of serviceable languages of communication is serious.

On the level of the ISHM itself, this question becomes acute. For the past fifty years, the business of the Society has been conducted in French; the AAHM has now instructed its delegate that French-English bilingualism is to be this delegation's most urgent pursuit. The point was made to some raised eyebrows at the Quebec Council meeting on August 23, but there is every reason to hope that changes will occur soon. Some patience is essential: a fifty-year habit cannot be changed in one week. The only other business of some importance was an increase in dues from thirty to forty French Francs, which seemed reasonable.

The Social Program for participants ranged from official receptions by the Mayor of Quebec, the Dean of the Laval University Medical School and the Lieutenant-Governor at Parliament House, to a chamber music concert at Trinity Cathedral and a choice of all-day excursions into the countryside—the luncheons, dinners, cocktail parties too numerous to mention, including a "traditional Quebec supper" followed by impromptu dancing.

The Program for Accompanying Guests (no longer called "Ladies' Program"—in deference to lady-scholars and accompanying men, we trust) ranged from guided tours to a fashion show, a high point being a visit to the Hôtel-Dieu, its library, 17th-century foundations and especially its magnificent and astonishingly rich museum treasures.

The 26th International Congress for the History of Medicine will be held on August 20-25, 1978 in Plovdiv (the ancient Philippopolis), Bulgaria, with the Society for the History of Medicine of Bulgaria as host. President: Mme Vera Pavlovo, Belo Moré 8, I.S.U.L., Sofia, Bulgaria. The topics for the Congress will be:

History of medicine in Bulgaria from antiquity to the present
History of military medicine
Folk medicine
Methodology and historiography of the history of medicine
Varia.

The official languages of the 26th Congress will be Bulgarian, Russian, English, French, Italian, German, Spanish and Portuguese. Excursions are planned to Sofia and Varna; registration cost is $60.00. At an appropriate date, AAHM members who wish to attend the 26th Congress will receive group travel information.

The place for the 27th Congress has not yet been officially chosen. The Quebec meeting has raised hopes that the AAHM may host such a conference sometime in the future: U.S. members now make up nearly one quarter of the total ISHM membership and might well take a more active part in this international society's life.

Dora B. Weiner
Member, Council AAHM
Vice-President, ISHM

ANNOUNCEMENTS

AMERICAN ASSOCIATION FOR THE HISTORY OF MEDICINE

Affiliation with the A.H.A.

The Association has been informed that its application for affiliation has been approved by the Council of the American Historical Association. In transmitting this welcome announcement, Mack Thompson, Executive Director of the A.H.A., expressed the belief that "a solid basis has been established for a mutually beneficial association."

Annual Meeting, 1977

The next annual meeting of the Association is scheduled to take place in Madison, Wisconsin, May 11-14, 1977.

Osler Medal Essay Contest, 1977

Students in medical schools of the United States and Canada and graduates of the class of 1976 are encouraged to enter the Osler Medal contest. The winning contestant will be awarded the Osler Medal and a cash prize of $200 and will be invited to attend the annual meeting of the Association, receiving an additional $200 to defray travel expenses. Essays in the history of medicine, of a maximum length of 10,000 words, must be submitted by March 1, 1977, to the Chairman of the Osler Medal Committee of the American Association for the History of Medicine, Dr. Wilhelm Moll, Health Sciences Library, Box 234, University of Virginia Medical Center, Charlottesville, Va. 22901. Further information about rules and eligibility should be obtained from Dr. Moll.

NATIONAL NEWS

Cincinnati

The newly founded Cecil Striker Society for the History of Medicine has created a Fund for the History of Medicine, named in memory of Dr. Cecil Striker who died on April 1, 1976. It will be maintained by the History of Health Sciences Division, which was created in 1974 to organize the historical collections of the University of Cincinnati's Medical Center Libraries. The Fund will be used to enrich the historical collection, especially to acquire materials on the history of diabetes and primary sources illustrating medicine in the Ohio River Valley in the 18th and 19th centuries. Contributions to the Fund can be sent to the Cecil Striker Medical History Fund, Medical Center Libraries, University of Cincinnati Medical Center, 231 Bethesda Ave., Cincinnati, Ohio 45267.

Institute on Human Values in Medicine

Under funding of the National Endowment for the Humanities, the Institute is offering fellowships to promote interdisciplinary study in projects related to the role of the humanities in medical education. In general, applicants must have a doctorate in the humanities or the medical sciences and two years teaching and/or clinical experience, but a limited number of fellowships are available to other health professionals and students. Fellowships, which usually do not exceed six months duration, range from $1,000 to $5,000. Further information and applications, which must be received at the Institute's office by 15 February 1977, are available from Thomas K. McElhinney, Director of Programs, Institute on Human Values in Medicine, 723 Witherspoon Building, Philadelphia, Pa. 19107.

Logan Clendening Traveling Fellowship in the History of Medicine

Applications are again being invited for the Fellowship which is tenable for three months during 1977. Established in memory of the late Dr. Logan Clendening, the Fellowship is of the value of $1,000 and is open to registered medical students (or college seniors accepted for medical school) of any recognized medical or osteopathic school in the U.S. or Canada. Applicants may elect to travel anywhere in the world to study any aspect of medical history. Application forms, which must be completed and returned by March 15, 1977, can be obtained from Robert P. Hudson, M.D., Chairman, Department of the History of Medicine, University of Kansas Medical Center, Kansas City, Kansas 66103.

National Research Council

The U.S. National Committee for the International Union of the History and Philosophy of Science of the National Research Council (2101 Constitution Ave., Washington, D. C. 20418) is sponsoring a travel grant program for the XVth International Congress of the History of Science, to be held in Edinburgh, Scotland, August 10-19, 1977. Applications for travel grant assistance, which must be completed and returned by March 1, 1977, can be obtained from the offices of the U.S. National Committee.

University of Texas Medical Branch

With the support of a grant from the Hogg Foundation for Mental Health, the Institute for the Medical Humanities is offering fellowships in the history and philosophy of mental health. The fellowships, which cannot exceed $12,000, will enable one or more qualified persons to spend varying periods of time, between July 1, 1977 and June 30, 1978, studying at the Institute for Medical Humanities in Galveston. Fellows may be graduate students in appropriate fields, or recent graduates, faculty members, researchers, administrators, clinical residents. Further information and application forms, which must be completed and received by February 1, 1977, should be requested from Dr. H. Tristram Engelhardt, Jr., Institute for the Medical Humanities, University of Texas Medical Branch, Galveston, Texas 77550.

Withering Film

An American company, Ciné-Men, has produced a 40-minute color and sound film, *Withering–the Discovery of Digitalis*. Adapted from *Historical Medical Classics* by Dr. John C. Krantz, Jr., Professor Emeritus of Pharmacology, University of Maryland, the film was photographed in England with a cast of professional actors, from a script written by John van Hart and Leroy Morais, with Jochen Breitenstein as producer and cinematographer. The film is an historical dramatization of episodes in Withering's life and his use of the foxglove in treating dropsy. In an epilogue, Dr. Helen Taussig discusses the use of digitalis in the 20th century. The film can be purchased from Ciné-Men Motion Picture Productions, Inc., 103 E. Read St., Baltimore, Md. 21202, at $315 a copy postpaid ($275 for 2 or more copies), or rented at $35 for a one-time showing. The rental fee can be applied against later purchase.

PROGRAMS OF MEETINGS

Bay Area History of Medicine Club, San Francisco

October 19, 1976: "Diseases of the Famous," Owsei Temkin.

College of Physicians of Philadelphia

September 22, 1976: "The Medical Imprints of Benjamin Franklin and His Philadelphia Peers," C. William Miller; "The Medical Therapy of Pow-Wowing: Early History in Europe to Surviving Practices in Modern America," Elmer L. Smith.

Handerson Medical History Society, Cleveland

October 6, 1976: "The History of Forensic Medicine and the Development of Forensic and General Pathology in Cleveland," Alan R. Moritz.

November 15, 1976; "Black Physicians in Cleveland," Creed F. Ward, Sr.

Josiah C. Trent Society for the History of Medicine, Durham, N.C.

September 14, 1976: "Home Medicine and Diagnosis—Changing Aspects of Nineteenth Century Medicine," John K. Crellin.

October 19, 1976: "The Marey Institute, Past and Present," Blaine S. Nashold.

November 18, 1976: "The Medical History of Samuel Johnson," Lawrence C. McHenry.

Mayo Foundation History of Medicine Society, Rochester, Minn.

July 14, 1976: "Bicentennial of the Foxglove; Early Digitalis Use in America," Howard B. Burchell; "The Botanic Medicine of Samuel Thomson," Ruth J. Mann.

Society of Medical History of Chicago

October 13, 1976: Public Memorial Service for Dr. Morris Fishbein at the Rockefeller Memorial Chapel, University of Chicago.

October 20, 1976: Morris Parker Lecture: "Home Medicine and Clinical Diagnosis: Changing Medicine in the 19th Century," John K. Crellin.

University of Virginia Medical History Society, Charlottesville, Va.

October 19, 1976: "Witchcraft and Other Medical Malpractice," Thomas G Benedek.

November 16, 1976: "The Medical Legacy of Apollo: Aesculapius and Hippocrates," Carrington Williams, Jr.

December 8, 1976: "Medicine and Surgery on the Early Western Frontier," Peter D. Olch.

Washington Society for the History of Medicine, Washington, D. C.

September 30, 1976: "Age-ism": Its Cultural Origins and Medical Significance, 1876-1976," Gerald J. Gruman; "Dr. Otto Loewi, the Man and the Scientist" (Film and Personal Recollections), Anna Weiss.

November 18, 1976: " 'The Compleat Surgeon': The Contributions of W. W. Babcock," Karl C. Jonas; "Histological Studies on the Skin of Egyptian Mummies," Luigi Giacometti.

NEWS FROM ABROAD

England

The publishing house of William Dawson & Sons has made a research grant to the University of Newcastle upon Tyne for a "Project for Historical Biobibliography." Under the direction of P.J. Wallis, the project will combine in computer-held records a wide range of British source material for subsequent publication. Begun in 1975, the project initially is focused on 18th-century books. Work on the catalogue of the British Library is already advanced, and in the next three years material from the Bodleian Library at Oxford and the Cambridge University library catalogues will be combined to produce in 1979 an author union catalogue of the majority of books in English or by British authors, published during the period 1701-1800. Discussions have begun with other libraries about the inclusion of their holdings, and the Wellcome Trust has made a grant to the project for the addition of 18th-century items from the Library of the Wellcome Institute for the History of Medicine.

Geneva

In October 1976 the Faculté de Médecine of the University of Geneva celebrated the 100th anniversary of its founding. In addition to the colloquium, "Geneva and Medicine," organized in collaboration with the Swiss Society of the History of Medicine and Natural Sciences, an exhibit, "Horace Bénédict de Saussure, explorateur des Alpes," was displayed at the Geneva Museum of Natural History. Also a limited issue of a commemorative medal has been struck, depicting on the obverse the medical school building, on the reverse the symbol of medicine and the university seal. The medal is offered, boxed, to collectors, in bronze (frs. 25), silver (frs. 100), and gold (frs. 1,590).

Montreal

Two graduate students at McGill University have prepared a 37-page "Guide to the Papers of Boris P. Babkin." Babkin (1877-1950) was a physiologist who was also the student and biographer of Ivan P. Pavlov. The Babkin papers, now housed in the Osler Library, consist of lecture notes, papers, and reprints in psychology; correspondence with Pavlov and his family; photographs, facsimiles, and papers used in writing *Pavlov: A Biography* (Chicago: University of Chicago Press, 1949); and a typescript of the biography. Free copies of the "Guide" are available from P. M. Teigen, Osler Library, McIntyre Medical Centre, McGill University, Montreal, P.Q. H3G 1Y6.

Vienna

On the occasion of the 100th anniversary of the birth of the neurologist and brain researcher, Constantin von Economo (1876-1931), a Constantin von Economo Centenary Symposium was held at the Institute of the History of Medicine at the University of Vienna, September 13-15, 1976. Held under the patronage of the International Brain Research Organization (IBRO) and UNESCO, the symposium was organized by the Institute for Brain Research, Department of Neurophysiology and Neuroanatomy, of the Austrian Academy of Sciences. Professor Erna Lesky gave the opening lecture, "Constantin von Economo—Life and Work." She was followed by M.A.B. Brazier (Los Angeles), "The Development in the 19th Century of Knowledge of Architectonics of the Cerebral Cortex," and K. Fleischhauer (Bonn), "The Last 50 Years and Some Problems of Today." The Institute of the History of Medicine also arranged a commemorative exhibit, "C. v. Economo and Brain Research in Vienna."

Correction

In the final printing, an error was introduced into the article by J. V. Pickstone, "Vital Actions and Organic Physics: Henri Dutrochet and French Physiology during the 1820s" (*Bull. Hist. Med.*, Summer 1976, *50*: 191-212). The following line should be substituted for the present line 13, p. 191:

Lamarck, who wished to maintain that separation of animals and plants for

BOOK REVIEWS

HOWARD B. ADELMANN. *The Correspondence of Marcello Malpighi.* 5 Vols. Ithaca and London: Cornell University Press, 1975. Vol. I (1658–1669), xx + 436 pp.; Vol. II (1670–1683), xii + pp. 437–916; Vol. III (1684–1688), vi + pp. 917–1420; Vol. IV (1689–1692), xiv + pp. 1421–1851; Vol. V (1693–1694), x + pp. 1851–2227. Ill. $95.00 (boxed).

In 1966 Howard Adelmann published a five-volume work on the life and the embryological accomplishments of Marcello Malpighi; it has no counterpart in the literature on the history of biology and medicine. Adelmann, trained conventionally as an embryologist and histologist, understood the hard data that Malpighi was uncovering. Self-educated as a historian, he has mastered the techniques of history to such a degree that he has become a scholar without peer in this realm of ideas. It was in part the combination of his talents as a biologist and as a historian that was responsible for the high superiority of *Marcello Malpighi and the Evolution of Embryology*; a third quality, his assiduity of concentration on a single individual and his contemporaries over a long number of years, also contributed. His mind was intellectually steeped in the life of the seventeenth century; he all but lived in it. When he inscribed a copy of the first volume of *Marcello Malpighi and the Evolution of Embryology* for a friend, he dated the inscription 31 March 1671.

When the set of five volumes on embryology appeared, it was widely acclaimed for the breadth of its scope, the depth and accuracy of its scholarship, and for the imaginativeness of the author's commentaries on Malpighi's writings. The set of volumes seemed to present as full a discussion of the life and work of a single embryologist as could possibly be desired. If it seemed a miracle that a work of such scope could be produced by a single man, with a doubly-trained mind, it is a super-miracle that within the space of ten years the same author could produce five more volumes, this time of letters, that supplement, but that are really also part of the organic whole that the first set of five volumes represents.

The five volumes of the *Correspondence* contain well over a thousand letters, written, insofar as their dates can be ascertained, between 1658, when Malpighi was around 30 years of age, and 1694, the year of his death. Four hundred sixty-seven of the letters were written by Malpighi; six hundred twenty-one were addressed by others to him. About a third of the letters by Malpighi and two-thirds of those to him appear here in print for the first time, and some of those previously published are corrected here.

The letters are presented in the language in which they were written, thus, with the rarest of exceptions, in Italian or Latin. They have not been translated into English; each is preceded by a brief English summary. The summaries are more than adequate in describing the principal content of the letters. Readers who have no Latin, for instance, may convince themselves of this by comparing Adelmann's abstracts of letters exchanged between Malpighi and Oldenburg with the full English translations of the same letters provided in the Halls' edition of the Oldenburg correspondence

BULLETIN OF THE HISTORY OF MEDICINE 50 630-635 (1976)

Copyright © 1976 by The Johns Hopkins University Press
All rights of reproduction in any form reserved

currently appearing. Adelmann's annotations to the letters, about which more will be said below, are superb; it is illuminating to compare them too with the annotations to the same letters in the Halls' edition of the Oldenburg correspondence. Adelmann wins. A reference list, confining itself only to works specifically referred to in the text and notes, covers well over 250 pages, and there is an ample index of great usefulness.

Among Malpighi's most frequent correspondents—those to whom he wrote or from whom he received more than fifteen letters each—were Lorenzo Bellini, Silvestro Bonfigliuoli, Giovanni Alfonso Borelli, Marcantonio III Borghese, Giovanni Battista Capucci, Antonio Ferrarini, Carlo Fracassati, Angelo Modio, and Henry Oldenburg. They were five physicians, an anatomist, a mathematician and physical scientist of high renown, the Secretary and factotum of the Royal Society of London. But a number of other scientists of note from a number of other lands are represented in the volume, either as correspondents or as subjects of correspondence, and so are non-scientists: Counts and Countesses, Grand Dukes, Princes and Princesses, Archbishops, Cardinals, and Popes, even the Holy Roman Emperor move in and out of the letters or the footnotes. But lesser figures add interest too; where else would we ordinary readers today make the acquaintance of Luigi Magni, for instance, who received his doctorates in philosophy and in medicine at Bologna in 1661 before he was eleven years old? Adelmann provides copious references to earlier studies of individuals named in the text or the footnotes, and an extraordinary number of these have been identified. Thus the volumes constitute, among other things, a sort of biographical dictionary that will be extremely useful to scholars working either in the history of 17th-century Italian science and medicine, or even in more general 17th-century Italian studies.

The first volume of the 1966 *Marcello Malpighi and the Evolution of Embryology* was a major biography of Malpighi, covering over 725 pages, entitled *Life and Works of Marcello Malpighi* (it will be referred to here simply as *Life and Works*). Many individuals named in the correspondence were referred to, and many of the letters given here in full were also either referred to, or quoted in part, in that volume. Thus the 1966 volumes and these new ones are truly part and parcel of each other.

The *Life and Works* dealt in detail not only with biographical facts, and with Malpighi's contributions to embryology, but also with his accomplishments and interests in medicine, anatomy, physiology, botany, entomology, and so forth. Thus there are few surprises about the accomplishments of Malpighi and his contemporaries in the letters, but we have the pleasure of reading about them in the words of Malpighi himself or of his friends and acquaintances.

Several features conduce towards the enhancement of this pleasure; one is the variety of subjects covered in the letters, another the style in which they are written, and, related to this, the insight they provide into Malpighi's personality, which perhaps emerges more vividly here than in the *Life and Works*.

The variety of the *dramatis personae* has already been commented on; it is as considerable for the scenes in which they moved and the causes, especially in science and medicine, with which they were concerned. Much medical advice is offered by Malpighi for the benefit of his correspondents' patients. His own work is discussed: on the lungs, on the anatomy of plants, on the glands, on the development of the chick and of mammals, and on many other subjects. But many other biological subjects are taken up in the letters: an ostrich, a seal, a camel, and dormice and tarentulae, rays and tapeworms are here, as are fossil sharks' teeth (*glossopetre*); millipedes are recommended as medicine, favorably, because they are so considerate as to roll themselves up into pill-like balls. Books figure importantly as subjects. Political news, for instance unrest in Messina, or student disturbances ("un gran fracasso"), appear, though much less frequently than in the Oldenburg correspondence. "Aristotle Contemplating the Bust of Homer" is mentioned; Malpighi was a connoisseur of painting, and he also collected medals. We read about water drainage and flood control, and Sicilian earthquakes. In short, about life in 17th-century Italy.

Also, when there is news of persons, including Malpighi himself, it is intensely personal, rather than technical or formal. We hear a great deal about Malpighi's health, and also about the time consumed by his medical practice and his dislike of it. Adelmann has told us such things in the *Life and Works* but they come through in brighter colors here when painted by Malpighi's own words. We learn, by reading directly the expressions of the esteem in which he was held by his friends and contemporaries, how he seemed to them as a man; he was kind and helpful to many of them.

But much of the understanding of his personality and thus of his relationships with his friends is revealed by the style in which the letters were written. This is the one feature of the correspondence to which the English abstracts cannot do justice, although on occasion they point out that some jocularity is included. Malpighi writes often, in the more informal letters, in a witty and rather ironic vein. Bellini writes to him that he is "dying of impatience" to learn about a particular piece of Malpighi's work; in another letter he indulges in some doggerel. No one dies of impatience in the Oldenburg letters. Thus this correspondence adds a dimension of liveliness into 17th-century life and letters that is missing in the volumes of Oldenburg correspondence, so much of which is composed in far more official tone.

A review of the Malpighi *Correspondence* in the London *Times Literary Supplement* concluded with the remark that as an amateur in the field, Adelmann has produced a model of scholarship which the professionals must strive to emulate. If Adelmann is not a professional, it is hard to know who is. Once more we are enormously in his debt.

Reviewed by Jane M. Oppenheimer, Ph.D., William R. Kenan, Jr., Professor of History of Science, Bryn Mawr College, Bryn Mawr, Pa.

Marielene Putscher, *Geschichte der medizinischen Abbildung*. II: 1600 bis Gegenwart. München: Heinz Moos Verlag, 1972. 207 pp. Ill. DM 74, 10.

Some years ago it was my privilege to review for the *Bulletin* Robert Herrlinger's monumental work *Geschichte der medizinischen Abbildung*, volume I (*Bull. Hist. Med.*, 1969, *43:* 485-6). In that book, the history of medical illustration was traced from antiquity up till the end of the sixteenth century. In concluding the review I expressed the wish that the untimely death of Professor Herrlinger would not preclude the publishing of the second volume which was to pursue the survey up till the present day. I was at the time, however, only too aware of the difficulty of finding another medical historian who would be equally well equipped to take up the subject as Herrlinger was.

The publishing firm made a very happy choice, in fact the best choice possible, by inviting Dr. Marielene Putscher to carry on the work from where Herrlinger had left it. Dr. Putscher, too, is a qualified art historian as well as a physician, and a well-known medical historian at that. The task which she was asked to take upon herself was an extremely heavy one. Since Dr. Herrlinger had left no notes or any other material which could be used in preparing the second volume, it actually meant the writing down of an entirely original book from initial research, which required a good deal of travelling. Moreover, the circumstance that the first volume had already appeared in print, implied that the job had to be finished in the not too distant future. This product of preparation under pressure appeared towards the end of 1972, but it shows no signs of the comparative haste in which it was conceived and materialized. On the countrary, it is a profound, ripe and well-balanced book, testifying to the exquisite taste of the author.

The end of the sixteenth century appears to be an expedient starting-point for a new volume on the history of medical illustration, since by that time the picture had "overtaken" textual description as it had been traditionally handed down, in the writings of Galen in particular. For the first time in history, when knowledge of the gross anatomy of bones and muscles had greatly increased, the picture could offer more information than the written text.

The subsequent development is traced by Dr. Putscher not only in its historical, graphic and artistic aspects, but also with regard to the question of what the illustration was actually supposed to offer in every single period—Renaissance, baroque, nineteenth and twentieth century—a question which cannot be answered without giving attention to the particular *object* in its historical context, as well as to the way the observer looked at the object. A certain philosophical undercurrent makes itself felt all through the book; more than once the psychological process which underlies the subjective act of seeing and the further conditions required in the actual "reading" of the picture are given thought to.

New ways of representation such as graphs or diagrams, new applications of older elements, such as the use of color, the introduction of photography and other more recent techniques—to mention the enormous quantitative increase of the material—present great difficulties in obtaining an overall view of developments since the middle of last century. The author, however, admirably succeeded in detecting line and logic in the seeming chaos.

The wealth of material revealed in this book is stupendous, but reading the text—the volume is a textbook rather than a reference book—requires a more than average knowledge of the German language; even then, however, non-German readers might not always grasp the message *per primam intentionem*. For this, of course, the German author can hardly be held responsible, but it does enhance the desirability of an English translation. It is taken for granted that the reader is familiar with historical art styles as well as with different techniques of graphic reproduction. The book is profusely illustrated by more than three hundred black-and-white reproductions—the quality of which seems to be better than of those in the first volume—and by numerous ones in colour. The present reviewer wonders, however, if the coloured picture XIII, 1 really represents a lung biopsy, it looks more like the endoscopic view of a bladder-stone to him.

A chronological source list, a list of annotations which, unlike the first volume, are not printed at the foot of the page, and a combined index of personal names and of subjects conclude the well-printed and well-bound volume. Author and publishers are to be congratulated on this exceptionally fine book, which stands on a par with Herrlinger's. The combined volumes will be the authoritative text on the subject for many years to come.

Reviewed by Daniel de Moulin, M.D., Director, Institute of the History of Medicine, Katholieke Universiteit, Nijmegen, The Netherlands.

Audrey B. Davis. *Circulation Physiology and Medical Chemistry in England 1650–1680*. Lawrence, Kansas: Coronado Press, 1973. x+ 261 pp. Ill. $8.50.

Walter Pagel, to whom this essay is dedicated, suggested the importance of studying the English reaction to the Harveian doctrine of the circulation in the mid-seventeenth century as an extension of his own subtle and thorough analysis of Harvey's physiology. Dr. Davis has combined this task with an analysis of two attitudes that she found prominent in late seventeenth-century England: a commitment to a medically useful physiology, and a faith in chemical analysis as the bridge from Harvey and physiology to the treatment of disease. The result of her study of this early blend of science and medicine, she predicts, will help us to define modern physiology in its "embryonic form." I am persuaded by her argument that the chemical, physiological and medical research of Thomas Willis and other English iatrochemists did form a coherent program which was effectively linked, conceptually if not practically, to the use of transfusion. The cornerstones of that program were its physiological assumption that the blood is the key to health and its chemical hope that distillation analysis could resolve the blood and solve the major problems of therapeutics. Davis plunges us into the details of this program, indicating the variations on the circulation iatrochemistry that sustained this British community in what she well describes as the joint bond of anatomical and analytical research. A further promise of the book that is not well documented is the parallel social bondage of this conceptually and geographically intimate group. Nor does she ever step outside the circle of their own endeavor to summarize the philosophical assumptions that made the work so rewarding to them. In her goal of treating the iatrochemists fairly by staying close to the material, she has offered little advice about the relationship of the embryonic and adult forms of modern physiology. Her work concludes with the statement that this iatrochemistry demonstrates the impact of Paracelsianism. Yet her book shows that it was far more than that, and that by 1680 it was also utilitarian, experimental and self-assured after a generation of exploring the possible combinations of circulatory physiology with medical and chemical concepts and practice.

This book, which meticulously incorporates all the unpublished as well as published works of the period, contains one inexplicable error. On page 45, Davis reproduces uncritically Charles Singer's 1922 diagram of the Galenic concept of the circulation with its well-known mistakes concerning the ebb and flow in the vena cava and the exhalation of vapors from the right ventricle.[1] She compounds the problem by calling this a figure from a "William Harvey—tercentenary commemoration—1957."

In conclusion, Coronado Press is to be condemned for producing a book that literally falls apart in your hands. A study containing valuable work deserves a stouter binding.

Reviewed by Diana Long Hall, Ph.D., Assistant Professor in History and Biology, Boston University, Boston, Mass.

---

[1] See Charles Singer, *The Circulation of the Blood* (New York, 1922), plate II, facing p. 9

THE BULLETIN RECENTLY RECEIVED*

G. C. Ainsworth, *Introduction to the History of Mycology*. New York & London: Cambridge University Press, 1976. xi + 359 pp. Ill. $27.50.

G. J. Barker-Benfield. *The Horrors of the Half-Known Life, Male Attitudes toward Women and Sexuality in Nineteenth-Century America*. New York: Harper & Row, 1976. xiv + 352 pp. $15.00.

James Bordley, III, and A. McGehee Harvey. *Two Centuries of American Medicine, 1776-1976*. Philadelphia: W. B. Saunders, 1976. xv + 854 pp. Ill. $19.75.

Gert H. Brieger (Editor). *Theory and Practice in American Medicine*. Historical Studies from the *Journal of the History of Medicine and Allied Sciences*. New York: Science History Publications, 1976. xv + 272 pp. Ill. $12.00 (cloth); $4.95 (paper).

Confederate States Medical and Surgical Journal. With an Introduction by William D. Sharpe. Metuchen, N.J.: Scarecrow Press, 1976 (History of Medicine Series Issued under the Auspices of the Library of the New York Academy of Medicine, No. 47). xiii + 224 + 48 pp. Ill. $22.50.

Paul Cranefield (Editor). *Claude Bernard's Edition of His Introduction à l'Etude de la Médécine Expérimentale*. New York: Science History Publications, 1976. xii pp. + 163 ll. $30.00 ($25.00 prepaid).

Hans-Heinz Eulner and Hermann Hoepke (Editors). *Georg Meissners Briefe an Jacob Henle, 1855-1878*. Gottingen: Vandenhoeck & Ruprecht, 1975 (Arbeiten aus der Niedersachsischen Staats- und Universitätsbibliothek Göttingen, Bd. 13). 104 pp. Ill.

Robert Forster and Orest Ranum (Editors). *Family and Society*. Selections from the *Annales. Economies, Sociétés, Civilisations*. Translated by Elborg Forster and Patricia M. Ranum. Baltimore & London: The Johns Hopkins University Press, 1976. x + 261 pp. Ill.

Vera S. Gavrilovic. *Zene Lekari u Ratovima 1876-1945, na Tlu Jugoslavija (Women Doctors in Wars on Yugoslav Soil)*. Beograd, 1976 (Yugoslav Scientific Society for Medical Pharmaceutical and Veterinary History, Monograph 9). 224 pp. Ill.

George E. Gifford, Jr. (Editor). *Physician Signers of the Declaration of Independence*. New York: Science History Publications, 1976. 164 pp. Ill. $10.00.

Saul Jarcho (Editor). *Essays on the History of Medicine*. Selected from the *Bulletin of the New York Academy of Medicine*. New York: Science History Publications, 1976 (History of Medicine Series Issued under the Auspices of the Library of the New York Academy of Medicine, 47). xi + 446 pp. Ill. $15.00.

Arthur G. King. *The Cincinnati Obstetrical and Gynecological Society, 1876-1976*. Cincinnati, 1976. 144 pp. Ill.

Charles Leslie (Editor). *Asian Medical Systems. A Comparative Study*. Berkeley: University of California Press, 1976. xiv + 419 pp. Ill. $16.50.

---

*The _Bulletin reserves freedom of decision as to the publications to be listed in this section Items received, other than those assigned for review, are ultimately incorporated into the collection of the Institute of the History of Medicine._

CONTRIBUTORS TO THIS NUMBER

JOYCE ANTLER is a Ph.D. candidate in American History, State University of New York at Stony Brook, Stony Brook, N.Y. 11794

DONALD G. BATES, M.D., Ph.D., is in the Department of the History of Medicine. McGill University, McIntyre Medical Sciences Building, 3655 Drummond St., Montreal, P.Q., Canada H3G IY6

SAUL BENISON, Ph.D., is Professor of History, University of Cincinnati, Cincinnati, Ohio 45221

EDWARD H. BENSLEY, M.D., is in the Department of the History of Medicine, McGill University, McIntyre Medical Sciences Building, 3655 Drummond St., Montreal, P.Q. Canada H3G IY6

RENÉ DUBOS, Ph.D., is Professor Emeritus, The Rockefeller University, York Ave. and 66th St., New York, N.Y. 10021

J. WORTH ESTES, M.D., is Associate Professor of Pharmacology and Experimental Therapeutics and of Socio-Medical Sciences (section on the History of Medicine), Boston University School of Medicine, 80 E. Concord St., Boston, Mass. 02118

DANIEL M. FOX, Ph.D., is Professor of Humanities in Medicine and Assistant Vice President for Academic Affairs, Health Sciences Center, State University of New York at Stony Brook, Stony Brook, N.Y. 11794

ROGER K. FRENCH, Ph.D., is Assistant Director of Research, Wellcome Unit for the History of Medicine, University of Cambridge, Free School Lane, Cambridge, England CB2 3RH

TOBY GELFAND, Ph.D., is Assistant Professor in the Program in History and Philosophy of Science, Princeton University, 220 Palmer Hall, Princeton, N.J. 08540

JUDITH W. LEAVITT, Ph.D., is Assistant Professor, Department of the History of Medicine, University of Wisconsin Center for Health Sciences, 1305 Linden Drive, Madison, Wis. 53706

LAWRENCE CHARLES PARRISH, M.D., is Associate Clinical Professor of Dermatology, in the School of Medicine and Adjunct Associate Professor of Comparative Dermatology in the School of Veterinary Medicine, University of Pennsylvania. He also is Chairman, Section of Medical History, College of Physicians of Philadelphia, Historian, American Academy of Dermatology, and Executive Editor, *International Journal of Dermatology,* 1601 Walnut St., Philadelphia, Pa. 19102

SAMUEL X RADBILL, M.D.,, is Honorary Librarian, College of Physicians of Philadelphia. His address is 224 Welsh Terrace, Merion, Pa. 19066

DAVID L. RANSEL, Ph.D., is Associate Professor in the Department of History, University of Illinois at Urbana-Champaign, 309 Gregory Hall, Urbana, Ill. 61801

DORA B. WEINER, Ph.D., is Associate Professor of History, Manhattanville College, Purchase, N.Y. 10577

INDEX OF NAMES—VOLUME 50*

Pagination according to issues:
No. 1 (Spring) 1-150
No. 2 (Summer) 151-307
No. 3 (Fall) 309-458
No. 4 (Winter) 459-656

Abbott, Grace, 572
Abbott, Maude E., 98, 99, 101, 106
Ackerknecht, Erwin H., 112, 234, 336
Acland, Henry, 342
Adelmann, Howard B., 630-632
Adelstein, Abraham, 149
Agassiz, 311
Agnew, D. Hayes, 76, 122
Ainsworth, G. C., 636
Albinus, 173
Alcmaeon, 52
Alcott, William A., 412
Al-Kindi, 457
Allbutt, T. C., 609
Allison, Richard, 245
Alsberg, Carl L., 382, 389
Amman, 173
Ampère, André-Marie, 206
Andrews, 478
Anson, *Sir* William, 614
Antler, Joyce, 569-595, 637
Aranow, Harry, 579
Arantius, 488
Aristotle, 46, 50, 53, 54, 58, 185, 486, 487, 488, 491
Armstrong, John, 262
Armstrong, W. A., 86
Arnstein, Elizabeth, 579
d'Arsonval, 312, 314
Asquith, H. H., 612
Athenaeus, 58
Atkinson, William B., 87
Atlee, Washington, 256, 258, 259
Avery, Oswald T., 459, 461, 463, 464, 465, 466, 467, 469, 470, 472, 473, 474, 475

Bacon, Francis, 151-173, 175, 185, 190
Baglivi, George, 181, 182, 188
Baker, Josephine, 569
Balfour, Arthur J., 603
Barber, Bernard, 224
Barber, Jonathan, 268
Bard, John, 522, 525
Bard, Samuel, 522, 523
Barker, L. F., 599
Barker-Benfield, G. J., 636
Barrett, John T., 110
Barrott, A. F., 424
Bartlett, Elisha, 269, 410
Barton, Wm. P. S. [C.], 262

---

* This index comprises the names of contributors as well as names in the text of original articles and titles of books reviewed, to the exclusion of bibliographies, reports, announcements, and similar materials.

Bartram, John, 80, 81
Bates, Donald G., 596-619, 637
Baudelocque, Jean-Louis, 248, 249, 250
Bauhin, Caspar, 481, 484, 485, 492
Beales, H. L., 339
Beardsley, E. J. G., 93, 98, 105, 106, 107, 108
Beaudette, F. R., 463
Beaumont, William, 90, 411
Beccaria, Giovanni Battista, 152, 153, 154, 157, 158, 159, 160, 162, 164, 165, 166, 172
Becher, 163
Bell, John, 262, 412
Bell, Whitfield J. Jr., 73-92, 109, 150, 517
Bellini, Laurenzo, 402
Benison, Saul, 459-478, 637
Bennet, Elizabeth, 246
Bennet, Jesse, 242-250
Bennet, Maria, 244
Bensley, Edward H., 596-619, 637
Bernard, Claude, 636
Betskoi, I. I., 502, 503, 510
Bett, W. R., 92
Bichat, Xavier, 192, 193, 195, 196
Biddle, Nicholas, 262
Bigelow, Willard D., 378, 381
Billings, Frank, 98
Billings, John Shaw, 413, 602
Bioletti, F. T., 377, 381, 390
Birkett, Herbert S., 616, 617
Bishop, Louis F., 98, 99, 102, 125
Black, Joseph, 166, 168
Blake, John B., 104, 113
Blainville, Henri-Marie Ducrotay de, 207, 208, 209, 210, 212
Bliss, Raymond, 126
Bodley, Thomas, 598
Boehmer, Auguste, 332, 333, 334
Boerhaave, Hermann, 154, 155, 156, 157, 158, 169, 170, 181, 189, 531
Bogaevskii, A., 235
Bonaparte, Charles Lucien, 78
Bond, Phineas, 523
Bond, Thomas, 75, 520, 523
Bonnet, Charles, 197, 198
Bordley, James, III, 636
Bordley, John Beale, 79
Borell, Merriley, 309-320, 458
Borelli, Giovanni Alfonso, 160, 181, 182, 472
Botal, 494
Botkin, S. P., 239
Bowditch, Henry I., 251, 254, 258
Bowers, John Z., 457
Boyd, *Sir* Edmund, 615
Boyle, Robert, 151, 158, 159, 161, 164, 167, 169, 323
Boylston, Zabdiel, 80
Brainerd, 313
Bramwell, *Sir* Frederick, 598
Brasch, Frederick E., 95
Breschet, Gilbert, 205
Brickell, John, 79
Brieger, Gert H., 138-139, 146-147, 636
Brissot de Warville, Jacques-Pierre, 551, 552
Broadbent, *Sir* William, 612
Brothwell, Don R., 435-442, 458
Broussais, François-Joseph-Victor, 208
Brown, John, 321-334
Brown, Samuel, 245, 248
Brown, Sanborn C., 306

Brown, *Sir* Thos., 607
Brown-Séquard, Charles-Édouard, 309-320
Brožek, Josef, 455
Brücke, Ernst, 191
Brunner, 173
Buckingham, Charles E., 253
Buechler, 333
Buffon, J. L. L., 161
Bulfinch, Thomas, 80
Bullough, Vern L., 301-303, 457
Burke, Georgina, 384, 386
Burns, Chester R., 147-148
Burr, Aaron, 81
Burr, Charles W., 90, 91, 97, 98, 104, 107, 108
Burrage, 112
Butler, C. S., 106
Bylebyl, Jerome J., 446

Cabanis, 200
Cabieses Molina, Fernando, 418
Cabot, Richard C., 35, 36, 37, 39
Cadwalader, Thomas, 75, 80
Caldwell, Charles, 77
Caldwell, L. L., 249
Camac, C. N. B., 99, 608
Cameron, Charles S., 145-146
Camp, John, 142
Capparoni, Pietro, 66
Carey, Mathew, 80
Carmichael, D. Erskine, 145-146
Carrel, Alexis, 462, 463
Carson, Joseph, 78, 79, 82, 83
Cartwright, Samuel A., 409, 410
Cassebohm, I. F., 173
Cassedy, James H., 115, 405-413, 458
Castiglioni, Arturo, 91, 106-107
Catherine II, 501, 502, 510
Celsus, 45, 513
Cesalpino, 485
Chadwick, Edwin, 4, 7, 339, 340, 341, 342, 343, 346, 349, 350, 353
Chalkley, Thomas, 75
Champneys, 616
Chance, Burton, 91, 92, 105
Channing, Walter, 272
Channing, William Ellery, 271
Chapin, 610
Chapman, 616
Chapman, Nathaniel, 77
Charcot, 91
Charles, William, 70
Chaucer, 69
Chaussier, François, 192, 193, 197
Chauvois, L., 480
Chekhov, Anton, 217
Chevreul, Michel-Eugène, 209
Cheyne, George, 184, 185, 186, 187
Chickering, Jesse, 12
Chittenden, Arthur S., 98
Chovet, Abraham, 76, 526
Church, Benjamin, 538
Churchill, Winston, 609
Cigna, Giovanni Franceso, 152-172
Cipolla, Carlo M., 301-303, 306
Clark, John G., 122
Clark, William Mansfield, 467
Clarke, Edwin, 454-455
Clearchus, 58
Clendening, Logan, 106, 126
Clossy, Samuel, 524
Coates, Benjamin H., 74, 75, 262
Cohen, Alfred E., 104
Colden, Cadwallader, 392-404
Colden, David, 393
Cole, O. T., 474

Cole, Rufus, 464
Colombo, 488, 494
Comte, August, 26, 208
Conkling, Roscoe, 25
Copeland, Royal S., 383
Cordell, Eugene F., 93, 94
Cornaro, Luigi, 552
Corner, Betsy Copping, 443-445
Corner, George W., 98, 112
Cornwallis, *Lord,* 79
Corson, Hiram, 255, 256
Cotton, F. J., 35
Courtney, James W., 98, 100, 104
Coxe, John Redman, 81
Cranefield, Paul, 191, 636
Crooke, *General,* 259
Crooke, Helkiah, 480, 481, 482
Crosby, Alfred W., 306
Cruikshank, Isaac, 91
Crummer, LeRoy, 98, 100, 104
Cruz, Oswald, 457
Cullen, William, 74, 81, 166, 531
Cumming, Hugh S., 389
Cumston, Charles G., 96, 97, 98, 99, 100, 104
Curtin, Roland G., 90
Curtis, Josiah, 17
Cushing, Harvey, 98, 99, 104, 108, 126, 597, 610
Cutter, Irving S., 92, 105
Cuvier, Georges, 195, 200, 202, 207, 263

Da Costa, 122
Daremberg, Charles, 151, 167
Darlington, William, 78
Darwin, Charles, 512
Davis, 601
Davis, Audrey B., 304-305, 634-635
Davis, Michael M., 30, 34, 39, 40, 41, 43, 44
Davison, Wilburt C., 101, 147-148
De Bow, J. D. B., 11, 12, 13, 14, 15
DeCandolle, Auguste-Pyrame, 196, 199, 200, 202
Dehoux, 313
DeKruif, Paul, 382, 390
Delbene, 385, 391
Delbene, Angelo, 373
Delbene, Antonio, 373
Delbene, Dominica, 372, 373
Delbene, Dominick, 373, 382, 383, 386, 389
Delbene, Joseph, 373, 386
Delbene, Lena, 373, 382, 386
Delbene, Mary, 372, 373, 382
Delbene, Paul, 372, 373
Delgado, Augustin, 419
De Renzi, Salvatore, 62, 64, 66, 67
Descartes, 181, 395, 492
Desfontaines, René-Louiche, 196, 198, 199
Dewhurst, Kenneth, 454-455
Dickens, Charles, 354
Dickson, Ernest C., 375, 381, 382, 384, 386
Diderot, 52, 532
Diocles, 57, 58
Dittrick, Howard, 106, 112, 113, 114
Dittrick, *Mrs.* Howard, 113
Dochez, Alphonse, 461
Dock, George, 110
Dorsey, John Syng, 77
Douglass, William, 81, 392, 526
Drabkin, David, 91

Drake, Daniel, 77, 80, 410, 411, 412
Du Bois-Reymond, Emil, 191, 211
Dubos, René, 459-478, 637
Dudley, Benjamin, 245
Duffy, John, 553
Dumas, Jean-Baptiste-André, 205
Dunbar, Newall, 313
Dunglison, Robley L., 76, 77
Dupuytren, 197
Durand, Elie, 79
Durkheim, Emile, 512
Durrenberger, E. Paul, 356-371, 458
Dusinberre, A. B., 102
Dutrochet, René-Joachim-Henri, 191-212
Dwight, Timothy, 539, 544, 546, 552

Eandi, G. A. F., 157, 167
Eaton, Amos, 78-79
Edison, Thomas, 471
Edward, *Prince of Wales,* 614
Edwards, William-Frédéric, 196, 201, 205
Eliot, Charles W., 602
Elliott, Jabez H., 106
Emerson, Haven, 413, 578
Emerson, Ralph Waldo, 271
Engels, Friedrich, 338
Enoch, 617, 618
Eoff, 246
Erasistratus, 45, 50, 487
Erismann, Friedrich, 235, 236, 239, 240
Ermengen, Emile van, 374
Eros, 68
Estes, J. Worth, 536-552, 637
Etziony, M. B., 143-144
Eudemus, 46
Eulner, Hans-Heinz, 636
Eustachius, 173
Evans, Lewis, 79
Evans, T., 69
Ewald, 601
Eyler, John M., 335-355, 458

Fallopius, 173
Farnham, Marynia, 579
Farr, William, 4, 12, 14, 16, 149, 336, 337, 338, 340, 342, 343, 344, 345, 346, 351, 355
Fasbender, H., 54
Fichte, Johann G., 322, 324
Field, Marshall, 110
Finlay, Carlos J., 306
Finlayson, James, 123
Fishbein, Morris, 95, 96, 98
Fisher, Irving, 41
Fisher, John D., 265
Flagg, J. F., 270
Flamant, Adolphe, 376
Flexner, Abraham, 2, 461
Flexner, Simon, 464
Flint, John, 270
Flourens, Pierre, 202
Foderà, Michel, 205, 206, 207, 208, 209, 212
Fontana, Felice, 161
Ford, Joseph Fabian, 113
Forster, Elborg, 636
Forster, Robert, 636
Foster, Michael, 171, 614
Fothergill, John, 520, 521, 524, 525
Fourcroy, Antoine, 535

Fowler, Orson, 272
Fox, Claire G., 143-144
Fox, Daniel M., 569-595, 637
Franchini, Joseph, 106
Francis, W. W., 598, 610
Franklin, Benjamin, 79, 80, 81, 152, 153
French, R. K., 478-500, 637
Freud, S., 144-145
Friedenwald, Harry, 101
Fulton, John F., 106, 111, 112
Futcher, Thomas B., 601, 610

Gairdner, William, 598
Galdston, Iago, 109, 113
Galen, 45, 46, 47, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 60, 65, 67, 91, 457, 482, 483, 486, 487, 488, 490, 491, 492, 515
Gall, Franz Joseph, 261, 262, 263, 264, 270, 271
Garden, Alexander, 396, 397
Garfield, James A., 23, 24, 25
Garrison, Fielding H., 95, 98-99, 101, 102, 104, 105, 108, 109, 112, 125, 174-190
Garrison, William Lloyd, 254
Garrod, 616
Gaskell, Peter, 354
Gatling, Richard J., 83
Gavrilovic, Vera S., 636
Gelfand, Michael, 457
Gelfand, Toby, 511-535, 637
George V, 614
Gerhard, William Wood, 122
Gerstenberger, H. J., 34
Gerstner, Patsy A., 303-304, 304-305
Gertsenshtein, G. M., 222
Gibbons, 259
Gibbons, *Cardinal,* 613
Gibier, Paul, 315, 316, 317, 318
Gibson, James, 245
Gifford, George E., Jr., 636
Gilbert, William Kent, 78, 79, 80, 81
Giorgi, Francisco, 179
Gmelin, Leopold, 198
God, 183, 254, 347, 403
Godfrey, Thomas, 79
Godfrey, Thomas, Jr., 80
Goebel, Walter, 470
Goethe, Johann Wolfgang von, 321, 322, 324, 328, 334
Goforth, William, 245
Goldin, Grace, 149
Goldwater, S. S., 37, 38
Gordon, William, 479
Gorrell, Frank E., 381
Graeme, Thomas, 75
Graham, John, 272
Graham, Robert, 385, 386
Graham, Sylvester, 412
Granjel, Luis S., 149
Grant, *Sir* Ludovic, 599
Graunt, John, 537
Gray, Asa, 79, 83
Greenhow, Edward Headlam, 344, 345, 355
Greiger, Jacob C., 382, 384
Grey, *Sir* Edward, 616
Griffitts, Samuel Powel, 74
Grigg, William, 266
Grigorescu, 313
Griscom, John H., 412
Grob, Gerald N., 4-27, 150, 299-301

Gross, Samuel D., 74, 76, 77, 82, 86, 87, 257, 258
Guerlac, Henry, 154, 163, 164, 167
Guglielmo de Saliceto, 66
Guy, William A., 340
Gwyn, Nona, 608, 611, 612

Hackett, C. J., 441, 442
Haden, Russell, 115
Hadley, Arthur T., 600
Haeser, Heinrich, 62
Hagen, Bernard, 418
Hale, Nathan G., 144-145
Hale-White, 616
Hales, Stephen, 160, 161, 164, 165, 167, 169, 173, 203
Hall, 79
Hall, Diana Long, 151-173, 307, 453, 634-635
Hall, Thomas B. Jr., 457
Hall, Thomas B. III., 457
Haller, Albrecht von, 154, 155, 156, 162, 164, 165, 170, 171, 172, 173, 198, 200, 397
Ham, A. A. G., 306
Hammond, W. A., 313
Handford, 616
Hannaway, Owen, 296-298
Hargreaves, G. D., 457
Harlan, James, 20
Harlow, Lewis D., 87
Harris, Robert, 602
Hart, Benjamin I., 95
Hartwell, J. S., 585
Harvey, A. McGhee, 306, 636
Harvey, William, 151, 161, 165, 173, 478, 480, 482, 483, 485, 486, 488, 489, 490, 491, 492, 493, 494, 495, 528
Hawkins, Nancy Hogg, 243, 246, 247, 250
Hawkins, William, 246
Hay, Matthew, 598
Hayward, George, 272
Heard, 126
Heidelberger, Michael, 470
Heinroth, Johann Christian, 149
Helmholtz, Hermann von, 191, 393
Helmont, J. B. van, 393
Heloise, 69
Hemmeter, John C., 98, 101, 102, 103, 104, 105, 125, 126
Henle, Jacob, 636
Henry, Frederick P., 87, 88
Henry, Joseph, 149
Henschel, A., 66
Herophilus of Chalcedon, 45-60
Herrick, James B., 106, 107
Herringham, 616
Hesse, Mary, 183, 185
Hewett, E. L., 424
Hickel, Erika, 301
Hill, R. H., 618
Hilts, R. W., 381, 383, 386, 387
Hippocrates, 50, 58, 65, 491, 515
Hodge, F. W., 424
Hoeber, Paul B., 90, 91, 94, 101
Hoepke, Hermann, 636
Hoermann, Alfred R., 392-404, 458
Hofmann, 484, 485, 486, 487, 488, 489, 490, 491, 494
Hogg, Peter, 246
Hoke, Edmund, 609
Holcomb, R. C., 106
Hole, John, 245
Holman, W. L., 101

Holmes, Oliver W., 83
Hooke, Robert, 126, 156
Hooker, Ransom S., 579
Hooker, Worthington, 413
Hoover, Herbert, 390, 584
Horner, William E., 77, 262
Houston, Francis, 245
Howard, Campbell, 613
Howard, Marjorie, 606, 610
Howard-Jones, Norman, 306
Howe, Julia Ward, 253
Howe, Samuel Gridley, 269
Hrdlička, Aleš, 417, 420, 421, 422
Hudson, E., 442
Hufeland, Christoph W., 332
Hume, David, 5
Hume-Rothery, Mary, 347, 348, 351
Hume-Rothery, William, 347
Humphreys, Alexander, 246, 247, 248, 250
Humpton, B. O., 603
Hunter, John, 78, 530
Hunter, Robert J., 106
Hunter, William, 530
Huntington, Albert T., 94
Hutchinson, James, 524

Ingalls, William, 268

Jackson, Chevalier, 91
Jackson, Hall, 536, 537, 538, 539, 541, 542, 543, 544, 546, 548, 552
Jackson, James, 266, 272
Jackson, Samuel, 77
Jacobs, Henry Barton, 98, 104, 602, 617
Jaggard, W., 480
Jaksch, R. von, 609
James I, 478
James, Thomas Chalkley, 74, 75
Jarcho, Saul, 112, 636
Jarvis, Edward, 4-27
Jefferson, Thomas, 81, 376
Jenner, Edward, 80, 538
John XXI, *Pope,* 67
Johnson, Samuel, 153
Johnsson, J. W. S., 103
Jones, John, 80, 524, 526
Jones, W. H., 420
Jourdain, 183
Judd, Neil M., 423, 430

Kant, 322
Kaufman, Martin, 251-260, 307, 457
Kay-Shuttleworth, James, 337
Kearsley, John, 75, 81
Keen, William, 74, 82, 86, 87
Kelly, Emerson, 113
Kelly, Howard A., 98, 109, 112
Kelly, Sydney, 113
Kemp, Martin, 306
Kempner, W., 385
Kempster, Walter, 555, 556, 557, 559, 561, 562, 563, 564, 565, 566, 568
Kennedy, Joseph C. G., 10, 11, 12, 16, 17, 18, 19
Kepler, 457
Kerner, Justinus, 373, 374
Kieckhefer, Charles, 555-556
Kiefer, George, 420
King, Arthur G., 242-250, 307, 636
King, James, 259

King, Lester S., 174-190, 307
Kingsbury, Charles A., 87
Kirkbride, Franklin B., 34, 35
Klebs, Arnold C., 97, 99, 100, 101, 108
Kleene, Gustav A., 33, 34
Klotz, Oskar, 101
Knight, Aquilla Leighton, 242, 243, 244, 245, 246, 247, 248, 250
Knight, Thomas Andrew, 197, 198, 200
Knobloch, T., 494
Koch, Robert, 314, 316
Kolb, Robert, 457
Konkle, Burton Alva, 88
Kosmak, George W., 573, 579, 580, 586, 587, 588
Kronik, David C., 306
Krug, Peter F., 226-241, 307
Krumbhaar, Edward Bell, 91, 92, 93, 94, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 111, 112, 125
Kühn, Karl Gottlob, 457

Laghi, Thomas, 161
Lagrange, Giovanni Luigi de, 153, 162, 163, 169
Lagunas R., Zaid, 414, 415, 419, 420
Laignel Lavastine, 95, 99
Lake, B., 480
Lamarck, Jean-Baptiste, 197, 199
Lambert, S. W., 585
Landis, Henry R. M., 97
Laplace, 206
Larkey, Sanford V., 108, 111
Larnach, S. L., 427
Laurens, André du, 481
Lavoisier, A. L. 151, 154, 158, 159, 160, 163, 167, 168, 170, 172
Leake, Chauncey D., 98, 112, 128-131
Leavitt, Judith W., 553-568, 637
Lee, Charles A., 407
Leeds, Daniel, 79
Leeds, Titan, 79
Legallois, J. J. C., 197, 200, 201
Legoyt, Alfred, 4
Leidy, Joseph, 83, 100
Leibniz, 189
Leitner, Helmut, 456
Lesky, Erna, 455, 456
Leslie, Charles, 636
Leuchs, J., 385
Levinson, Stephan A., 142
Lewis, Samuel, 78
Lewis, Winslow, Jr., 265, 270
Libman, Emanuel, 98
Lieberkuhn, 173
Lindberg, David C., 457
Lindeboom, G. A., 149, 306
Lint, Jan G. de, 103
Lister, Joseph, 253
Lobenstine, Ralph W., 579
Locy, William A., 95
Logan, James, 80
Long, Esmond R., 106, 107, 110, 112
Loomis, H. P., 313
Loudon, 607
Louis, Pierre, 6
Louis Philippe, 91
Lower, Richard, 156, 157, 163, 168
Ludwick, Christopher, 74
Ludwig, Carl, 191
Lynch, Kenneth M., 127
Lyonnet, 173

McCrae, Thomas, 608, 611, 614, 616
McDaniel, Walton B., II, 92, 93, 106, 111, 126
McDowell, Ephraim, 77, 115, 122, 242, 245, 248
McElhinney, Thomas K., 288-289
McGee, W. J., 415
McGovern, John P., 147-148
Mackintosh, Ashley, 614
Macintosh, N. W. G., 427
MacIntyre, Donald, 78
Macphail, Andrew, 106, 611
Magendie, François, 192, 193, 194, 195, 196, 197, 202, 203, 204, 205, 206, 207, 208, 209, 210, 212
Major, Ralph, 112
Malin, William G., 74
Malloch, Archibald, 101
Malpighi, Marcello, 630-632
Malthus, Thomas Robert, 537, 545, 548
Mancini, Clodomiro, 62
Mann, Horace, 271
Marburg, W. A., 607
Marcus, Adalbert F., 321, 332, 333, 334
Marie, Pierre, 601
Marion, John Francis, 149
Martin, E. S., 605
Martine, George, 155, 157
Martínez Durán, Carlos, 110
Matas, Rudolph, 108
Mauro, 67
Mayow, John, 156, 158, 159, 160, 161, 163, 168
Meckel, 173
Medici, Ferdinand, 488
Meek, B. B., 383
Meigs, Charles, 526
Meigs, Grace, 572
Meissners, Georg, 636
Meldrum, A. N., 154, 164, 167
Menzies, 481
Meyer, A. W., 416, 417, 418
Meyer, Karl Friedrich, 381, 382, 384, 386, 390
Middleton, Peter, 80, 527
Middleton, William Shainline, 98, 102, 106, 122-127, 128-132, 133-137, 527
Miki, Sakae, 457
Miller, Genevieve, 93-121, 150, 274-287, 307
Miller, Joseph Lyon, 242, 243, 244, 245, 246, 247, 428
Miller, William Snow, 105, 123, 125
Miller, *Mrs.* William Snow, 123
Milne-Edwards, Henri, 196, 205
Mirbel, C.-F. Brisseau de, 196, 199, 200, 202
Mitchell, John, 392, 393
Mitchell, S. Weir, 81, 82, 602
Mitchell, Thomas Duché, 77
Moes, B. H., 91
Molleson, I. I., 219
Molleson, T., 442
Monod, Jacques, 477
Montaigne, Michel, 91, 604
Montgomery, Thaddeus, 589
Moore, Anna, 33, 34
Moore, C. B., 424
Moore, Norman, 616
Mora, George, 149
Morgagni, G. B., 89, 173
Morgan, John, 74, 80, 83, 89, 511-535

Morisani, Ottavio, 599
Morris, Caspar, 74, 75, 76, 77, 82
Morris, J. Cheston, 82
Morris, James Polk, III, 446
Morton, Samuel George, 84
Morton, Thomas G., 84, 85, 86
Moschkowitz, Eli, 101
Mott, Valentine, 77
Moulin, Daniel de, 632-634
Muller, *Mrs.* Max, 606
Mul'tanovskii, M. P., 240
Muñiz, Manuel Antonio, 415
Munro, 606
Murphy, Edmond A., 306
Musschenbroek, 169, 170, 173

Napoleon, 262
Naumov, D. A., 236
Nehemiah, 376
Neill, James, 466, 467
Neill, John, 78
Neison, F. G. P., 340
Neuburger, Max, 92, 96, 97, 103, 106, 123
Nevins, Allan, 461
Newton, Isaac, 152-153, 155, 173, 323
Nickel, D., 56
Niebyl, Jennifer R., 145-146
Niethammer, Friedrich J., 324
Noble, Daniel, 349
Norris, George W., 76, 77
Norris, Isaac, 75
Norris, William F., 88
Numbers, Ronald L., 457
Nutton, Vivian, 457
Nysten, 197

Oks, Boris, 218, 221
Oleson, Alexandra, 306
Oliver, John Rathbone, 104
Olmstead, 601
Onderdonk, Henry, 79
O'Neil, R. F., 35
Oppenheimer, Jane M., 630-632
Oribasius, 47
Orlov, V. I., 237
Orr, W. S., 101
Osipov, Evgraf A., 230, 231, 232, 233, 234, 237, 238, 239
Osler, Britton Bath, 613
Osler, Edmund Boyd, 612
Osler, Edward Revere, 608, 612, 614, 616, 617
Osler, Ellen Mary, 613
Osler, Grace Revere, 602, 603, 604, 605, 612, 614, 615, 617
Osler, Jeannette, 608
Osler, William, 89, 92, 99, 109, 111, 115, 122, 123, 269, 596-618
Owen, Griffith, 75

Pace, Antonio, 152
Packard, Francis R., 88, 89, 92, 97, 101, 270
Pagel, Julius, 123
Pagel, Walter, 296-298, 480
Paine, Thomas, 80
Palmer, E., 424
Pancoast, Joseph, 122
Papanicolau, George N., 145-146
Pappenheimer, A. M., 477
Paré, Ambroise, 78
Parente, Pascal P., 62
Parish, Lawrence Charles, 619-622, 637

Pasamanick, B., 270
Pasteur, Louis, 315
Paulus, Heinrich E., 324
Pearl, Raymond, 413
Pelton, Garnet Isabel, 37
Pemberton, James, 521
Penn, Thomas, 520
Pennock, Caspar Wistar, 122
Pepper, O. H. P., 97
Pepys, Samuel, 91
Percival, Thomas, 534
Perry, Marshall S., 270
Peskov, P. A., 237
Petit, Jean-Louis, 527
Petrus Hispanus, 66, 67
Pettenkofer, Max von, 236
Peucer, Caspar, 457
Phillips, E. D., 452-453
Phylotimus, 58
Physick, Philip Syng, 77, 90, 262
Pickstone, J. V., 191-212, 307
Pilcher, Lewis Stephen, 101, 103
Pitcairne, 402
Platearius, John, 61, 64
Platearius, John, Jr., 61, 64
Platearius, Matthew, 61, 64
Plater, Felix, 494
Plato, 491, 605
Playfair, William, 599
Pleadwell, Frank L., 98
Pliny, 175
Plumpton, 611
Poe, Edgar Allan, 80
Poirot, Hercule, 174
Poisson, Simeon-Denis, 206
Polacsek, Richard A., 301
Polak, John O., 579, 580
Poling, Dorothy, 244, 245, 249, 250
Pollard, 616
Porrett, Robert, 205
Porterfield, William, 398, 399, 400, 401, 402, 403, 404
Portugalov, V. O., 235
Post, Wright, 90
Pott, Percival, 530
Potter, Paul, 45-60, 150, 452-453
Powell, *Miss*, 610
Powell, Robert C., 144-145
Power, *Sir* D'Arcy, 99, 110, 478, 480, 483, 484, 490, 616
Praxagoras, 51, 58
Prevost, 601
Prévost, Jean-Louis, 205
Priestley, Joseph, 159, 168
Primerose, James, 489, 491, 492, 493
Prince, 522
Priscianus, 67
Purcell, Elizabeth, 457
Putscher, Marielene, 632-634

Quen, Jacques M., 299-301
Quesnay, François, 182, 533, 534
Quetelet, Adolphe, 4, 335
Quincy, Josiah, 266
Quintillian, 67

Radbill, Samuel X, 113, 619-622, 637
Rambaud, George Gibier, 316, 318, 319
Ramer, Samuel, 213-225, 307
Ramsay, David, 75
Ramsford, W. S., 611
Rankin, Adam, 245
Ransel, David L., 501-510, 637

Ranum, Orest, 636
Ranum, Patricia M., 636
Rauschenberger, William G., 562, 563
Ray, Isaac, 270
Read, Alexander, 478-500
Read, Thomas, 478
Redman, John, 74, 76, 81, 523
Reiche, Rainer, 306
Reil, Johann C., 325, 326
Reingold, Nathan, 149
Renaudot, Théophraste, 514
Revere, Susan Tilden, 608, 610
Ricardo, David, 337
Richmond, John Lambert, 242
Riesman, David, 92, 97, 98, 102, 105, 107, 122, 125, 126
Riolan, Jean, 488, 491, 492
Risse, Guenter B., 133-137, 321-334, 458
Rittenhouse, David, 74
Ritterbush, Philip C., 184
Roberts, Frank H. H. Jr., 423
Robertson, 611
Robinson, G. Canby, 101, 103
Robinson, Victor, 94, 95, 101, 104, 106
Rodriguez Esposito, César, 306
Roentgen, Wilhelm, 126
Roeschlaub, Andreas, 321, 329, 330, 332, 333, 334
Roger of Parma, 61
Rogers, Frank B., 112
Roland, 66
Rolleston, *Sir* Humphry Davy, 106, 616
Rosen, George, 28-44, 112, 150, 337, 511
Rosenau, M. J., 379
Rosenberg, Charles E., 306, 553
Rosenkrantz, Barbara Gutmann, 146-147
Ross, Ronald, 616
Rothschuh, Karl E., 149
Rousset, François, 247
Rowntree, L. G., 98
Rozier, 166
Rudolph, Robert, 555, 556, 557, 558, 562, 563, 564
Rufus of Ephesus, 45, 50, 51, 54, 56, 57
Ruhräh, John, 95, 103
Rumsey, Henry Wyldbore, 338, 351, 352, 353, 354, 355
Ruschenberger, W. S. W., 83, 88, 89
Rush, Benjamin, 74, 77, 81, 88, 89, 244, 245, 261, 407, 523, 525
Russell, Archibald, 10
Russell, *Sir* John, 462
Rutebeuf, 69, 70
Ruysch, 173

Sailer, Joseph, 99, 125
Saint-Hilaire, Etienne Geoffroy, 201
Saint-Simon, 208
Saluces, *Comte* de, 153, 154, 162, 163, 166
Sanctorius, 173
Sanderson, John Burdon, 602
Sappington, John, 457
Sargent, John Singer, 610
Sarton, George, 96, 106, 108
Sauvages, 531
Say, Thomas, 79
Schäfer, 616

Scharf, J. Thomas, 87, 88
Schelling, F. W. J., 321-334
Schiaffino, Rafael, 110
Schiller, Joseph, 191, 322, 324, 328
Schlegel, August W. von, 332
Schlegel, Caroline, 332, 333, 334
Schmidt, Alexander M., 391
Schoepf, Johann David, 80
Schultz, Adolph H., 109, 110, 113
Schweinitz, George E. de, 79, 95
Schwenchke, Thomas, 155, 157
Seelig, Major G., 101
Ségalas, Pierre-Salomon, 207
Sellers, 79
Sellman, John, 245
Senebier, Jean, 198
Serra, Junipero, 376
Sewall, 126
Sharpe, William D., 636
Shattuck, George C., 253, 254
Shattuck, Lemuel, 4, 10, 11, 412, 541
Shippen, William, 521
Shippen, William, Jr., 75, 83, 520, 524
Short, Charles W., 77, 79
Shryock, Richard H., 90, 91, 106, 108, 112, 113, 114, 126, 526
Shurtleff, Nathaniel, 269
Sigerist, Henry E., 3, 86, 92, 93, 97, 99, 100, 101, 103, 106, 107, 108, 109, 110, 111, 112, 113, 126
Silliman, Benjamin, 79
Simon, John, 336, 340, 341, 342, 344, 353, 355
Sims, James Marion, 77, 122
Singer, Charles, 66, 68, 69, 94, 97, 99, 101, 103, 106
Singer, Dorothea W., 66, 68, 69
Sinitsyn, A. A., 227
Skalon, V. Iu., 236, 237
Smibert, Williams, 523
Smith, Adam, 512, 522, 532, 533
Smith, Nicola, 603, 610
Smith, T. Southwood, 7
Snow, Edwin M., 25
Snow, John, 345
Sokolov, N., 235
Sondern, Frederic E., 579
Soranus, 45, 54, 56, 57
Spalding, Lyman, 537, 538, 539, 541, 546, 547, 548
Spallanzani, Lazaro, 151, 169, 170, 196
Spector, Benjamin, 112, 113, 619-622
Spiegel, Adriaan van den (Adrianus Spigelius), 484, 485, 486, 489, 493, 494
Spittel, R. L., 441
Spoehr, Alexander, 435, 441
Spurzheim, Johann Christoph, 261, 262, 263, 264, 265, 266, 267, 268, 270, 271, 273
Stahl, Georg, 163
Steiner, Walter R., 101, 106, 107, 109
Stepan, Nancy, 457
Stevenson, J. Greely, 265, 266
Stevenson, Lloyd G., 1-3, 112
Stevenson, Sarah Hackett, 260
Stewart, Alexander B., 380, 381
Stewart, T. D., 414-434, 435, 441, 458
Stickney, 601
Stillé, Alfred, 122, 258, 259
Storer, D. Humphrey, 407
Storer, H. R., 259

Story, Thomas, 75
Strachan, 480
Strother, Edward, 188, 189
Sudhoff, Karl, 92, 96, 97, 106, 123
Sue, Jean-Joseph, 531
Susser, Mervyn, 149
Swammerdam, Jan, 149, 173
Sydenham, Thomas, 91
Sylvius, Jacobus, 180, 393

Tallmadge, Guy Kasten, 104
Taylor, Fredrick W., 39
Taylor, Jacob, 79
Temkin, Owsei, 3, 106, 112, 126, 191
Tennent, John, 81, 522
Tertullian, 46
Thayer, William S., 601
Thévenot, Melchisedec, 149
Thom, Charles, 386
Thomas, Enos, 247
Thomas, Gabriel, 80
Thomas, H. M., 599
Thomas, K. Bryn, 149
Thomas, Maria, 247
Thomas, Seymour, 610
Thompson, John D., 149
Thompson, N. W., 246
Thompson, R. E., 32
Thomson, Elizabeth H., 443-445, 458
Thorwald, Juergen, 247
Thurston, Richard, 537, 538, 539, 541, 546, 547, 548
Tilghman, William, 79
Toner, Joseph M., 78, 80, 83
Torrey, John, 79
Trembley, 173
Tricot-Royer, 94
Trocta, 68
Trollope, Anthony, 604
Trottus, 68
Trotula, 61-72
Trout, Hugh, 247
Truax, 272
Truxton, *Commodore,* 80
Tucker, Aaron B., 262
Tucker, David A., Jr., 114
Turner, Thomas B., 147-148
Tuttle, Edward F., 61-72, 150
Tyson, Job R., 74

Ulmus, 494
Unschuld, Paul Ulrich, 306
Urquhart, *Sir* Thomas, 71

Van Ingen, Philip, 579
Variot, 313
Varolius, 488, 494
Veratti, Giuseppe, 161, 162
Vernon, F., 602
Vesalius, 111, 173, 484, 492, 494
Veselovskii, Boris, 217, 222
Vicq d'Azyr, Félix, 193
Viets, Henry R., 98, 103
Villagra Cobanera, Maria Elena, 417
Villard, Henry, 23
Villeneuve, 313
Virchow, Rudolf, 337, 429
Virgil, 337

Wahl, Emil, 564
Waksman, Selman, 459, 464

Waleus, 173
Walker, A. Earl, 454-455
Walker, Francis Amasa, 25
Walker, W. M., 424
Wallace, Helen M., 149
Wallace, William M., 257
Walsh, Anthony A., 261-273, 307
Walsh, James J., 98
Warburg, E. M., 107
Ware, John, 266, 272
Warner, Andrew R., 30
Warren, John Collins, 263, 264, 265, 266, 267, 272, 273, 412
Warthin, A. S., 101, 102, 105, 106, 125
Washington, George, 250, 376
Watson, Benjamin P., 579, 586, 587
Watson, John Fanning, 75
Webb, Gerald, 101, 125
Webster, John W., 272
Webster, Noah, 75, 536
Weed, Lewis H., 2
Weems, *Parson,* 250
Weidenreich, Franz, 428, 429
Weil, E., 480
Weiner, Dora B., 622-624, 637
Weiss, Pedro, 414, 415, 418, 419, 422, 430, 434
Welch, William H., 1, 2, 3, 102, 103, 104, 105, 106, 108, 113, 125, 126, 602
Wellcome, Henry, 104
Weller, Carl V., 102, 106, 125
Westcott, Thompson, 87, 88
Westfall, Richard S., 453
White, 601
White, Ellen G., 457
White, *Bishop* William, 80
Whitlock, Richard, 71
Whytt, Robert, 396, 397, 398, 400, 401, 402, 403, 404
Wilbur, Ray Lyman, 375
Wiley, Harvey Washington, 378, 391
Willcock, *Miss* J. F., 618
Williams, J. Whitridge, 575
Williams, Philip, 588, 589, 590, 593-594
Williams, William H., 306
Williamson, Alex., 602
Williamson, Ellen, 602
Willis, Thomas, 180
Winslow, 173
Wöhler, 210
Wood, George B., 76
Wood, Horatio C., 89
Woodbury, Frank, 85
Woodfield, Charmian, 435, 442
Woodfield, Paul, 435, 442
Wright, Ottilie, 611, 612, 613
Wunderlich, 511
Wyndham, G., 609
Wynne, James, 17, 75

Yandell, David W., 259
Young, G. M., 335
Young, James Harvey, 372-391, 458

Zachary, Lloyd, 75
Zakrzewska, Marie, 254
Zedwitz, *Count,* 347
Zeuch, Lucius H., 105
Zhbankov, D. N., 229
Zilboorg, Gregory, 110
Zola, Émile, 91

BULLETIN OF THE HISTORY OF MEDICINE

ORGAN OF
THE AMERICAN ASSOCIATION FOR THE HISTORY OF MEDICINE
AND OF
THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Founded by HENRY E. SIGERIST
Editor—LLOYD G. STEVENSON
Assistant Editor—JANET B. KOUDELKA

ADVISORY EDITORIAL BOARD

JOHN B. BLAKE
GEORGE W. CORNER
SAUL JARCHO
ESMOND R. LONG
GENEVIEVE MILLER
PETER H. NIEBYL
THOMAS B. TURNER
A. EARL WALKER

VOLUME 50

BALTIMORE
THE JOHNS HOPKINS UNIVERSITY PRESS
1976

©COPYRIGHT, 1976 BY THE JOHNS HOPKINS UNIVERSITY PRESS

TABLE OF CONTENTS

Editorial: Bicentennial, Centennial and Semicentennial: LLOYD G. STEVENSON 1
Edward Jarvis and the Federal Census: GERALD N. GROB 4
The Efficiency Criterion in Medical Care, 1900-1920: GEORGE ROSEN 28
Herophilus of Chalcedon: An Assessment of His Place in the History of Anatomy: PAUL POTTER 45
The *Trotula* and Old Dame Trot: A Note on the Lady of Salerno: EDWARD F. TUTTLE 61
Practitioners of History: Philadelphia Medical Historians before 1925: WHITFIELD J. BELL, JR. 73
The Missing Seal, or Highlights of the First Half Century of the American Association for the History of Medicine: GENEVIEVE MILLER 93
The Way of the Medical Historian: WILLIAM S. MIDDLETON 122
"Bacon's Mansion": The Frustrations and Rewards of Respiratory Physiology in the Enlightenment: DIANA LONG HALL 151
The Fielding H. Garrison Lecture: Evidence and Its Evaluation in 18th-Century Medicine: LESTER S. KING 174
Vital Actions and Organic Physics: Henri Dutrochet and French Physiology during the 1820s: J. V. PICKSTONE 191
Who Was the Russian Feldsher? SAMUEL RAMER 213
The Debate over the Delivery of Health Care in Rural Russia: The Moscow Zemstvo, 1864-1878: PETER F. KRUG 226
The Legend of Jesse Bennet's 1794 Caesarian Section: ARTHUR G. KING 242
The Admission of Women to 19th-Century American Medical Societies: MARTIN KAUFMAN 251
Phrenology and the Boston Medical Community in the 1830s: ANTHONY A. WALSH 261
American Association for the History of Medicine: Report of the 50th Anniversary Meeting: GENEVIEVE MILLER 274
Brown-Séquard's Organotherapy and Its Appearance in America at the End of the Nineteenth Century: MERRILEY BORELL 309

Schelling, "Naturphilosophie" and John Brown's System of Medicine: GUENTER B. RISSE 321

Mortality Statistics and Victorian Health Policy: Program and Criticism: JOHN M. EYLER 335

Lisu Curing: A Case History: PAUL DURRENBERGER 356

Botulism and the Ripe Olive Scare of 1919-1920: JAMES HARVEY YOUNG 372

Cadwallader Colden and the Mind-Body Problem: ALFRED R. HOERMANN 392

An Early American Hangover: The Medical Profession and Intemperance 1800-1860: JAMES H. CASSEDY 405

Are Supra-Inion Depressions Evidence of Prophylactic Trephination? T. D. STEWART 414

René Dubos and the Capsular Polysaccharide of Pneumococcus: An Oral History Memoir: SAUL BENISON 459

Alexander Read and the Circulation of the Blood: R. K. FRENCH .. 478

Abandoned Children of Imperial Russia: Village Fosterage: DAVID L. RANSEL 501

The Origins of a Modern Concept of Medical Specialization: John Morgan's *Discourse* of 1765: TOBY GELFAND 511

"As Healthy a Place as Any in America": Revolutionary Portsmouth, N.H.: J. WORTH ESTES 536

Politics and Public Health: Smallpox in Milwaukee, 1894-1895: JUDITH W. LEAVITT 553

The Movement Toward a Safe Maternity: Physician Accountability in New York City, 1915-1940: JOYCE ANTLER and DANIEL M. FOX 569

TEXTS AND DOCUMENTS

Sir William Osler's Autobiographical Notes: EDWARD H. BENSLEY and DONALD G. BATES 619

NOTES AND COMMENTS

Further Evidence of Treponematosis in a Pre-European Population from Oceania: D. R. BROTHWELL 435

MEDICO-HISTORICAL NEWS AND ACTIVITIES
Correspondence and Reports
William Shainline Middleton, 1890-1975 (Chauncey D. Leake) 128
An Account of the Wisconsin Chair in Medical History (Guenter B. Risse) 133
Appointments in the History of Medicine 138, 446
Society for Health and Human Values (Thomas K. McElhinney) 288
Betsy Copping Corner, 1888-1976 (Elizabeth H. Thomson)... 443
Benjamin Spector, M.D., 1893-1976 (Samuel X Radbill and Lawrence Charles Parrish 619
International Congress for the History of Medicine (Dora B. Wiener) 622
Announcements 140, 290, 448, 625
BOOK REVIEWS 142, 296, 452, 630
CONTRIBUTORS TO THIS VOLUME 150, 307, 458, 637
INDEX OF NAMES (VOLUME 50)............................ 639

INDEX OF NAMES—VOLUME 50*

THE ROCKEFELLER UNIVERSITY PRESS
PROUDLY ANNOUNCES A NEW BOOK BY

RENÉ J. DUBOS

THE PROFESSOR,
THE INSTITUTE,
AND DNA

This is the story of the personal life and scientific achievements of Oswald T. Avery—an extraordinary man virtually unknown outside the scientific community Yet he and his colleagues discovered that DNA carries hereditary information, and so revolutionized genetic research.

These profoundly important pages of medical history include a warm description of Avery's life-style and work-style at The Rockefeller Institute for Medical Research, written by a scientist-writer of deep sensitivity and perception, who shared Avery's interests and was a member of his laboratory.

Dr. Dubos, himself an eminent bacteriologist, here also unfolds the development of medical research in the United States and the philosophical concepts that lie behind today's understanding of the immunology of bacterial infections.

262 PAGES 21 ILLUSTRATIONS APPENDIXES
BIBLIOGRAPHY INDEX

For your copy, send your check for $14.50 to:
Order Service, The Rockefeller University Press.
1230 York Ave , New York, N.Y. 10021

CHARLES C THOMAS • PUBLISHER

AN HISTORICAL ACCOUNT OF PHARMACOLOGY TO THE TWENTIETH CENTURY *by* **Chauncey D. Leake,** *Univ. of California, San Francisco.* Prehistoric empirical drug lore, codified empirical drug use, Muslim drug innovations, drug development in the Renaissance, and transition to twentieth century pharmacology are among topics discussed. This unconventional book gives references in the text to indicate the resources of information and opinion. *'75, 224 pp., 2 il., 1 table, cloth-$12.50, paper-$8.95*

HUMANISM IN MEDICINE *edited by* **John P. McGovern,** *Univ. of Texas, Houston, and* **Chester R. Burns,** *Univ. of Texas, Galveston, Foreword by* **Wilbert C. Davison.** *(12 Contributors)* This book is a collection of essays from a symposium on humanism in medicine posing such questions as why William Osler is revered as a medical humanist, what manifestations of humanism can be found in the history of medicine, and whether humanism has a place in the construction of goals and priorities in medicine. *'74, 132 pp. (7 x 10), 7 il., $9.75*

ALEXIS CARREL: VISIONARY SURGEON *by* **W. Sterling Edwards,** *Univ. of New Mexico, Albuquerque, and* **Peter D. Edwards.** *Foreword by* **Charles A. Lindbergh.** This biography describes the life and personality of a remarkable man and scientist, his interests, accomplishments and character, and his scientific achievement which won him the Nobel Prize. Among his accomplishments discussed in this book are his techniques of arterial suture, blood vessel grafts, organ transplants and, with Charles Lindbergh, the predecessor of today's heart-lung machines which have made open heart surgery possible. *'74, 160 pp., 27 il., $5.00*

Prepaid orders sent postpaid, on approval

301-327 EAST LAWRENCE
SPRINGFIELD • ILLINOIS • 62717

A System of Complete Medical Police

Selections from Johann Peter Frank

edited, with an introduction, by Erna Lesky

Johann Peter Frank (1745-1821) is widely regarded as the founder of the modern science of social medicine. This translation makes key sections of his multivolume life's work available for the first time in English. An introduction by Erna Lesky, director of the Institute for the History of Medicine at the University of Vienna, situates Frank in his age and examines the contemporary relevance of his ideas. Offering a fascinating view of the mores and culture of late-eighteenth century Austria, the system is of interest to specialists in a broad range of disciplines, including history, sociology and social psychology. $18.50

The Causes of Profound Deafness in Childhood

George R. Fraser

A leading expert on hereditary deafness presents detailed comparative findings from three surveys, which he personally conducted, of more than 3,500 deaf individuals. The study treats deafness syndromes in four categories: those showing simple Mendelian inheritance, syndromes associated with malformations of the head and neck, deafness due to acquired causes, and cases whose causes have not been traceable. Throughout, Fraser draws heavily from his own personal experience in the surveys to illustrate findings and to serve as a basis for genetic analysis and frequency estimates. $22.50

Burn Therapy and Research

Witold Rudowski, Wieslaw Nasilowski, Witold Zietkiewicz, and Konrad Zienkiewicz

This authoritative treatise by a leading Polish surgeon and his colleagues describes the physical effect of burn injury and gives a comprehensive account of various methods of treatment. The methods range from simply allowing spontaneous healing to the most refined techniques of debridement and skin grafting. Chapters also are devoted to shock, metabolic and respiratory disturbances, infection, toxicity, and immunology, as well as psychotherapy and rehabilitation. In addition, the contributors focus on three segments of the community who are at high risk — children, old people, and pregnant women. A final section of the book describes future research needs. $18.50

Johns Hopkins

The Johns Hopkins University Press, Baltimore, Maryland 21218